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VETERINARY MEDICINE

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Actinobacillosis in Cattle

Vaccination against Pneumoencephalitis (Newcastle Disease) by Atomization or Nebulization with the B_1 Virus

Instances of Reproduction with Uterus Unicornis and Uterus Didelphys

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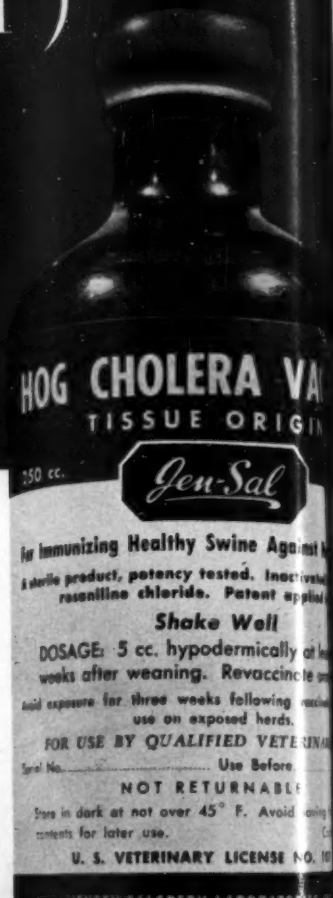

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Medical And Surgical Oxygen In Small Animal Practice

LEE R. PHILLIPS, D.V.M., and B. STEWART BURKHARDT, D.V.M.,
Lakewood, Colorado

OXYGEN therapy is now an established and routine procedure in many small animal practices. This has been developed because of the constant demand made through daily presentation of cases showing definite clinical symptoms of anoxemia. Clients often will recognize the symptoms of oxygen want in their pets and ask if specific therapy is available when they present the animals for treatment.

The respiratory exchange (rate of metabolism) in the dog is much higher than that of man, illustrating the need of oxygen therapy in small animal practice in cases of anoxemia.

COMPARATIVE RESPIRATORY EXCHANGE

	Oxygen consumed[1] cc. per kg. per hr.	Carbon dioxide produced cc. per kg. per hr.
Man	302	257
Dog	847	652

A deficiency[2] of oxygen in body tissues is manifested by rapid pulse, elevated temperature, dyspnea, restlessness and mental confusion. Cyanosis indicates more severe anoxia. As this condition progresses, slowing of the heart and respiratory rate occurs just before death. Anoxia may be classified on the basis of the type of disturbance of the oxygen-supplying mechanism.

1. Anoxic anoxia results from failure of ventilation and may be caused by: (a) obstruction of the airways or paralysis of the respiratory muscles; (b) failure of absorption, as caused by pneumonic inflammation or edema; (c) an insufficient pressure of oxygen, as occurs at high altitude; (d) respiratory depression, as caused by sedative and narcotic drugs, and (e) oxygen displacement by other gases, as in anesthesia.

2. Stagnant anoxia results from a slowing of the circulation of the blood and may be divided into: (a) general, such as occurs in cardiac decompensation or shock; and (b) local, such as occurs in trauma or local inflammation.

3. Anemic anoxia results from an alteration of, or an inadequate amount of, hemoglobin in the blood which makes it impossible for the cellular elements to carry sufficient oxygen to supply the needs of the body. This may occur after hemorrhage, in anemia and carbon monoxide poisoning.

4. Histotoxic anoxia is the failure of the tissue cells to utilize oxygen, such as occurs in cyanide poisoning.

Physiological Considerations

The action[3] of oxygen administration in a normal subject will increase the heart rate and raise the blood pressure. In therapeutics, this gas is used in the treatment of cyanosis, dyspnea, circulatory failure, the administration of anesthesia with ether or anesthetic gases, and in inhalation therapy. The purpose of oxygen therapy[4] is to overcome want of oxygen, which is due to some interference with proper oxygenation of the blood, as previously outlined.

Diaphragmatic hernia cases and those that have had chest injuries are usually in a state of anoxemia. In the presence of fever, the metabolism is increased and oxygen want is thereby increased. If the patient is to be benefited, the amount and concentration of the oxygen employed must be sufficient to compensate for the impairment in the oxygen exchange. Oxygen makes up about one-fifth of the atmosphere, regardless of the altitude.

	Oxygen[5]	Carbon dioxide	Nitrogen
Inspired	20.93	.03	79.04
Expired	16.29	4.21	79.50

In some cases, 30% oxygen will be adequate to correct deficiency; in other instances as high as 70% may be required. Continuous use of pure oxygen is harmful, but for periods not exceeding eight hours of the 24, a concentration as high as 90% has been found safe. In many cases from 45 to 50% is the most desirable concentration. The oxygen limit for mammals over a long period of time is 70%, beyond this, poisoning and death will result. Death is caused, strange as it may seem, by anoxemia; the pulmonary epithelium becomes so damaged by the excessive amount of oxygen that the gas

cannot pass to blood elements in amounts sufficient to maintain life.

Administration of Oxygen as a Therapeutic Agent

Some oxygen tents designed for human use have been demonstrated to be practical for application to animal therapy. Dr. Robert P. Knowles,[6] Miami, Fla., in his discussion of Oxygen and Oxygen Equipment at the Ameri-

Fig. 1. Oxygen cylinder, with mounted flowmeter and pressure reducing valve, on cylinder cart. Tube from tank is attached to cooling tank (lower right). Tank holds water and ice to cool oxygen as it passes through copper coil to cage.

can Animal Hospital Association Meeting, held in Denver, Colo., April 1950, describes a plastic thermal oxygen tent, with a removable ice tray, which is a very efficient unit used for oxygen therapy, inhalation therapy and as an incubator. The authors have used a homemade oxygen cage, which is two feet wide, three feet deep and two feet high. The top is covered with plate glass to allow observation of the patient. The door on the front of the cage has a removable plate glass. By removing the glass from the door, the patient does not have to be removed from the cage when oxygen is not being administered.

The oxygen is delivered to the top of the cage, cooled by passing over ice and diffused throughout, and then settles down to the patient. The oxygen may be cooled by passing through large pieces of ice about the size of two fists, or it may be passed through copper tubing immersed in a chamber filled with cracked ice. The warm carbon dioxide rises to the top of the cage and escapes through four vents. There is one vent in each corner of the cage, 1½ inches in diameter, adjacent to the top. In handling a case with a subnormal temperature, the ice is withheld for a few minutes to increase the temperature of the cage. For febrile cases, the ice chamber is filled as soon as the animal is placed in the cage, and the oxygen flow is increased to about ten liters per minute, which floods the cage, and the animal's temperature is lowered by breathing in the cool oxygen.

Assure Proper Oxygen Concentration

If equipment[7] is to fulfill its purpose, it must be able to maintain the desired oxygen concentration, because cage or tent therapy is no better than maintenance of proper concentration. The oxygen content should be tested at least two or three times a day when it is in continual use, because the flow into the cage is not necessarily an indication of the concentration. Most oxygen analyzers work on the principle of the measurement of the volume of gas remaining in a gas sample of specified volume after the oxygen has been absorbed. The accuracy of these oxygen analyzers for tent therapy need only be within a ± 3 or even 5%. Therefore, the apparatus may be reduced to its simplest form and the copper-ammonia-chloride reagent with pure copper may be used. Equipment usually consists of a glass jar filled with copper cloth of 30 mesh, dilute ammonium hydroxide, and ammonium chloride, or ammonium nitrate, solution. Such an oxygen-absorbing solution, being alkaline, also absorbs carbon dioxide. The St. Luke's model oxygen analyzer (homemade) was devised to meet the need for simplicity in operation and for low cost. The several oxygen analyzers on the market, though less simple in operation, are satisfactory. The manufacturer's directions for their operation should be used.

In general, relative humidity should be maintained between 40 and 60%. Carbon dioxide content should be not more than 1.2%. If a minimum flow of six to eight liters of oxygen per minute is required to maintain a concentration of 50%, harmful accumulations of carbon dioxide will not take place, even in the absence of soda lime. If lesser rates of oxygen

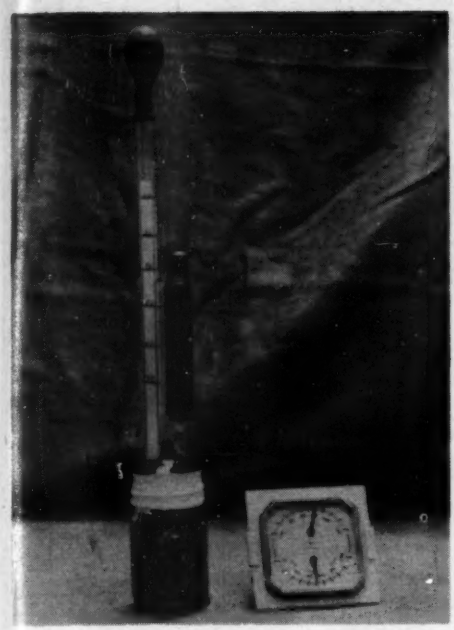

Fig. 2. Oxygen analyzer. The device illustrated consists of a bottle filled with copper trimmings and dilute ammonium hydroxide with ammonium chloride added. The 10 cc. glass syringe is used for sampling. A glass tube, to which a predetermined scale is attached, is inserted through the second opening of the rubber stopper. A thermometer-humidiguide completes the necessary equipment for determining oxygen concentration.

flow and higher concentrations of oxygen are desired, soda lime should be used. For short periods, stimulation of the respiratory center by slightly increasing the carbon dioxide, may be of value in such conditions as carbon monoxide poisoning, drowning, electrical shock, atelectasis of the newborn, and when there is shallow breathing.

For practical purposes, the number of liters of oxygen in industrial or commercial cylinders may be estimated by multiplying the pressure by three. The length of time these cylinders will last can be estimated by first multiplying the pressure by three and dividing by the flow in liters per minute. For example, if cylinder pressure is 350 lb. and flow is 6 liters per minute (l.p.m.), the cylinder will last 175 minutes ($350 \times 3 \div 6 = 175$).

Antibiotic Inhalation Therapy

The effectiveness of penicillin inhalation therapy is thought to be dependent on production of a spray of very small particles. For this reason, nebulizers which produce aerosol, such as the vaponefrin and DeVilbiss no. 40, are employed. Crystalline penicillin is preferable because it is less irritating. Quantities of 30,000 to 100,000 units, depending on the size of the dog, are dissolved in 1 cc. of sterile normal saline, and placed in the vaporizer. The vaporizer is attached to the high pressure rubber tubing leading from the regulator valve on the oxygen tank, and then connected to the tent or cage. The flow of oxygen is regulated to vaporize the 1 cc. of solution in approximately ten minutes, which usually calls for about eight liters of oxygen per minute. The animal may be left in the cage an additional ten minutes or until the cloud of vapor is gone. This treatment may be given at intervals varying from once a day to every three hours and has been found very useful in all types of respiratory inflammation and infection, including rhinitis, sinusitis, laryngitis, bronchitis and pneumonia. With this type of therapy, the penicillin mist bathes the involved respiratory tissues.

Oxygen in Surgical Procedures

Following is a description of technic in using a Heidbrink gas-oxygen apparatus for anesthesia and analgesia, which is based on fundamental procedures that have been employed in

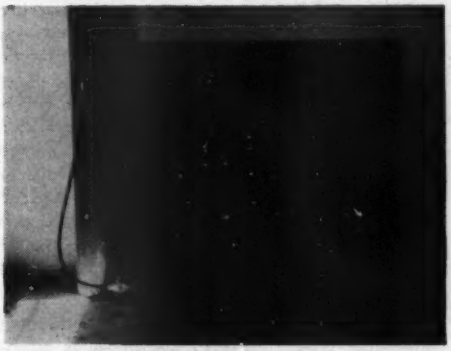

Fig. 3. Oxygen therapy cage used by the authors. Illustrated is the method employed for antibiotic inhalation therapy. The nebulizer (see fig. 4) is attached to an opening in the lower part of the cage. In this manner, mist is concentrated at the level of the recumbent animal. A removable plate glass is attached on the cage door and a glass panel for observation of the patient is fitted to the top. When the cage is used for oxygen therapy, the nebulizer is removed and this cage aperture closed. It is used for obtaining gas samples for concentration tests. Tank containing cooling coil is placed on the top of the cage. Oxygen then flows at the prescribed rate from the cylinder, through the cooling tubes, and enters the cage at the top, where it is diffused downward. Warm carbon dioxide escapes through four vents in the top of the cage.

hundreds of cases. It is offered as a guide to the mechanical operation of the equipment, rather than a didactic outline of procedure. In giving any type of anesthesia, the patient is always the guide to dosage and administration. Gadd[8, 9] and Dinsmore[10] have reported the numerous advantages of using intratracheal anesthesia.

Medication administered[11] preliminary to ether anesthesia must not depress respiration markedly, for the absorption and elimination of ether depends largely on adequate respiratory exchange. The marked effect of morphine sulfate is a frequent source of difficulty in inducing anesthesia with ether regardless of the size of the dose of narcotic. When barbiturates are used with morphine as preliminary medication, the dose must be small, as there is a considerable depressing effect on respiration due to the action of barbiturates and especially when the barbiturates are combined with morphine.

Preanesthetic medication is given in the form of atropine and morphine, or atropine and demerol, 20 to 30 minutes before general anesthesia. Atropine sulfate, 1/300 to 1/100 gr., is given hypodermically, according to size, with ¼ gr. of morphine sulfate per 20 to 30 lb. body weight, or 2 mg. of demerol per lb. Morphine is used only in young animals that are considered good surgical risks. Demerol is used in place of morphine in those cases considered poor surgical risks, such as in the older animals with heart, liver and kidney involvements and all animals in a state of toxemia or shock. Atropine should always be used before inserting an endotracheal catheter in order to avoid laryngospasm and secretion along the respiratory tract. This drug will dilate and dry the bronchial tree. Laryngospasm frequently follows the use of intravenous barbituric acid derivatives.

In order to effect relaxation for endotracheal intubation, a light form of anesthesia is established with intravenous sodium pentothal to effect until the mouth is relaxed with the palpebral reflex still present, which usually requires about 1/15 to 1/10 gr. per lb. A small dose of sodium pentothal for induction should be used, in this procedure, in order to avoid respiratory depression, which would make it difficult to continue administration of anesthesia by inhalation.

Following insertion of the endotracheal catheter, the rebreathing bag is inflated with nitrous oxide gas and the inhaler tubes are attached to the catheter. Nitrous oxide is used at this stage for two purposes; (1) since it is an asphyxial agent, we have found it to stimulate respiration even more than oxygen-carbon dioxide mixtures, at this stage of anesthesia, and (2) it will hold the animal in light anesthesia while the sodium pentothal relaxation is leaving, which usually requires only two to four minutes. Nitrous oxide has not proved satisfactory in our experience when used alone for initial induction.

Next, the flow of oxygen is adjusted according to the requirements of the animal as determined by body weight. For example, the

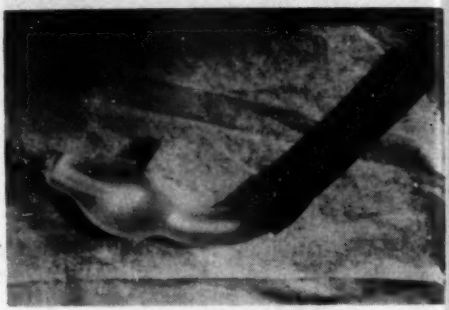

Fig. 4. Nebulizer. The antibiotic to be used is injected through the small opening in the center of the nebulizer, which is then closed by means of a rubber stopper. High pressure tubing from the oxygen tank is attached to the small opening (left); the large opening (right) leads to the cage.

average dog of 25 to 30 lb. will use about 300 cc. of oxygen per minute. Following two to three minutes of respiration in the rebreathing bag, it may be emptied and reinflated with nitrous oxide. This procedure removes the inactive nitrogen and replaces it with nitrous oxide that has accumulated in the rebreathing bag. Nitrogen dilution of the anesthetic gas is thus avoided and is of no future trouble during anesthesia because the system is closed. The animal is maintained at this stage for minor surgical operations.

When further relaxation is required for major surgery, ether is administered to effect by opening the ether vaporizer and increasing the intrapulmonary pressure from 3 mm. to about 7 mm. mercury pressure. The intrapulmonary pressure is not increased beyond 17 mm., even in thoracic surgery because of the danger in rupturing alveoli. The ether vaporizer may be adjusted in various openings by gradations of tenths, ranging from one-tenth to wide open. When the desired depth of anesthesia is established, the soda lime absorber is turned on to remove the carbon dioxide that has accumulated in the rebreathing bag, in order to maintain as nearly an effortless breathing as possible.

The animal is maintained in this stage with practically no further adjustment because anesthesia gas and ether vapors are used over and over again in the rebreathing bag with a closed system. Diethyl ether is one of the best anesthetic agents available to produce relaxation.

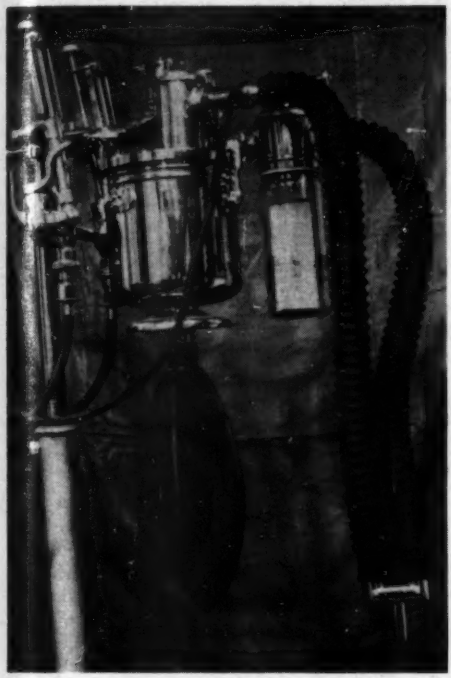

Fig. 5. Heidbrink gas-oxygen apparatus for anesthesia. Nitrous oxide and oxygen tubes (left) are attached below flowmeters; oxygen-carbon dioxide cylinder (O_2—90%; CO_2—10%) attached by tube (right) to apparatus between soda-lime cannister and ether vaporizer. Rebreathing bag (center) has a capacity of 2.5 liters. Inhaler tubes (right) are fitted with adapters for attachment to endotracheal catheters.

For intrathoracic surgery, respiration is maintained by light hand pressure on the rebreathing bag. The rate and depth of respiration can easily be maintained in all other surgical procedures outside of the thorax, by controlling the amount of carbon dioxide in the system. For abdominal surgery, closures, etc., respiration is relaxed and made to have minimum effort by turning the carbon dioxide absorber wide open, and vice versa, to stimulate respiration, the soda lime absorber is partially or completely turned off, as desired.

When surgery is nearing completion, demerol is administered again as in preanesthesia for relaxation and to avoid postoperative shock. Fluid therapy is administered at this time, or earlier, as indicated. The carbon dioxide absorber is turned off and the pressure valve is opened to 3 mm. mercury pressure. With light hand pressure on the rebreathing bag, the anesthetic gas and ether vapor is expelled through the opened pressure valve. The bag is then inflated again with 90% oxygen and 10% carbon dioxide. The carbon dioxide stimulates respiration and the high percentage of oxygen brings about fast recovery from anesthesia. This procedure may be repeated two or three times, if necessary, expelling the ether and stimulating the animal.

We have had no postoperative shock complications resulting from this type of rapid recovery from anesthesia, due to the use of fluids and sedatives following the surgery and during convalescence. This type of oxygen therapy relieves the liver of detoxifying duties following the use of anesthetic. This is of especial importance in geriatrics, in toxic cases and those suffering traumatic shock. Satisfactory symptoms of living functions as manifested by healthy red mucous membranes, calm respiration and steady, full pulse are evident when the patient is removed from the machine. This may be in some favorable contrast compared to those observed preanesthesia.

Mixtures of anesthetic agents have been proved to be safest. The continual flow of pure

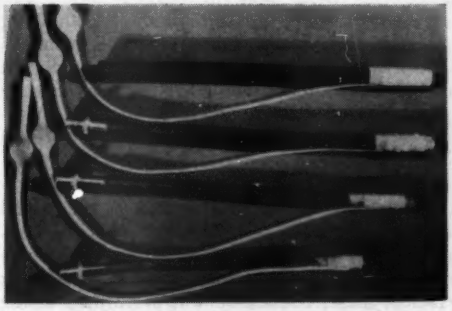

Fig. 6. Plastic endotracheal catheters fitted with cuffs and bulbs. The bulbs (shown at left) act as indicators to show when the cuff on the trachea tube is inflated.

oxygen eliminates the danger of anoxemia, which is considered the greatest surgical hazard. This procedure is used in any case where anesthesia with a barbituric acid derivative may be too depressing for the animal or too difficult for it to eliminate, when given in the amount required to produce relaxation of sufficient length of time to accomplish the surgery. A classification for the use of this type of machine may be based on the type of surgical case presented.

1. Poor surgical risks as found in geriatrics, with evidence of tachycardia, nephritis, hepatitis and the general complications of senility; traumatic shock, as found in the various types of accident cases with wounds and fractures; toxemia, such as those presented after prolonged dystocia, or toxic absorption from pyometra, endometritis and similar conditions.

2. Surgical cases in need of additional supplementary anesthesia, which may be necessary for relaxation or continuation of surgery, and where increased dosage of the basic anesthetic is undesirable.

3. Where rapid recovery is desired on ambulatory cases, such as dental extractions, fish hook and porcupine quill removals and all types of minor surgery.

4. Where an open airway is essential during surgery to maintain adequate ventilation and as a safeguard against aspiration, such as in the removal of salivary, branchial, or thyroglossal cysts, or in gastrotomy and enterostomy, or in tonsillectomy and resection of the soft palate and various types of surgery in the mouth and pharynx.

5. Where positive intrapulmonary pressure is necessary, such as in thoraic surgery and repair of diaphragmatic hernias.

Summary

Records were kept on the first 100 cases, presented in routine practice, where the prognosis was guarded or unfavorable, and where supplementary anesthesia or oxygen therapy was desired. Routine surgery, such as ovariohysterectomies, castrations and all surgical procedures on young, healthy and normal animals, where regular intravenous sodium pentobarbital anesthesia was used, is not included in this record. From 100 cases, 95% satisfactory recoveries were obtained and no losses could be directly attributed to anesthesia. In two of these, euthanasia was performed at the time of surgery, due to advanced metastatic malignant neoplasms, as determined by laparotomy. One accident case with a crushed pelvis, eviscerated urinary bladder and intestines and extensive pulmonary hemorrhage was lost. Two severe toxic cases expired; one was a chronic pyometra and the other was a dog that had been in dystocia for four days, with subnormal temperature and a gangrenous uterus, at the time of surgery. This number includes 34 patients ten years of age or older.

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▼ ▼ ▼

Illinois Grade A Milk Law

In adopting recommendations by the U. S. Public Health Service, the Department of Public Health, state of Illinois, in Educational Health Circular 135, accepts those provisions having to do with brucellosis infection in cows.

"By January 1, 1955, all milk and milk products for pasteurization shall be from herds certified by the BAI as following one of the procedures approved by the BAI for the eradication of brucellosis. A test certificate identifying each animal, giving date of current test and signed by an accredited veterinarian and the laboratory making the test shall be posted in the milkhouse."

In addition the Department has added the footnote: "Bureau of Animal Industry Plan A is the only present procedure for the eradication of brucellosis."

▼ ▼ ▼

The people of this country (Great Britain) must face the fact, comments the *British Medical Journal*, December 2, 1950, editorially, that the National Health Service is heading for bankruptcy. Dr. Ffrangcon Roberts foresaw this as far back as February 1949, when, observing that "through ignorance and miscalculation in its preparation the cost of the Health Service has been grossly underestimated," he prophesied that the alternative to financial ruin would be shortage of personnel and materials.

". . . The medical profession (in Great Britain) is discontented and disillusioned, not because of payment, or lack of it, for this or that, but because it sees postponed indefinitely the opportunities for improving the medical care of the people."

Revised Program For The Control And Eradication Of Bovine Brucellosis In Pennsylvania

C. P. BISHOP,* V.M.D., Harrisburg, Pennsylvania

BRUCELLOSIS of cattle is one of the most destructive maladies with which the cattle breeder must deal. It is also of vital interest as it relates to public health, the extent and importance of which are not generally appreciated.

The control and eradication of brucellosis in cattle have a twofold purpose; (1) to protect human health and (2) to reduce or overcome the economic loss caused by the disease.

The control of this widespread disease in cattle has depended, during the last few years, upon various plans. To be successful in control of infections, it is essential that full use be made of all proved methods of control. All of these contribute to a common end. No single measure has thus far proved supreme.

Pathogenesis Sufficient for Control

The basic knowledge of brucellosis in cattle, though not complete, affords an ample foundation upon which to build effective measures for its control. With the creation of such control procedures, it is possible to measure our progress and success by the number of clean herds established, rather than by the number of tests conducted or the number of calves vaccinated.

One of the chief reasons that eradication has not progressed as rapidly as some have expected or would like, is failure in recognizing the peculiarities of the disease; and the fact that even though successful in the eradication of tuberculosis, the same general plan and methods used in tuberculosis eradication would not suffice in the control and eradication of brucellosis. A single procedure is applicable to the control and practical eradication of tuberculosis; no such procedure will accomplish comparable results in Brucella infection. This disease is different from most other infectious diseases in many respects, and therefore necessitates a broader approach in applying control measures. For example, the rapidity with which it may spread under certain conditions differs from others, as does the variety of manifestations it exhibits.

Another disturbing factor that has contributed much to confuse matters concerned with the control and eradication of this malady are articles which have appeared in the farm press. These endeavor to attribute the success attained in individual herds to some certain special plan of procedure, when, in reality, the disease had merely become quiescent. In these, credit was acclaimed without due consideration for the natural behavior of the disease.

Basic Principles of Disease Control

There are two basic principles to consider in establishing control procedures; (1) the test and slaughter plan, which provides for the testing, identification, isolation or the removal of infected animals from the herd, in order to eliminate exposure of the remaining disease-free animals; and (2) the artificial production of resistance to the disease in susceptible cattle. Both procedures have been sufficiently employed, either alone or in combination, to recognize their advantages and limitations.

Those familiar with the disease have come to realize that it is an individual herd and farm problem to which specific study and attention must be given for successful eradication.

A most substantial understanding of any method of solution for bovine brucellosis came with the development and standardization of the blood serum agglutination test. Application of the test with good herd management and sanitary practices have had wide acceptance among cattle owners and veterinarians. These principles, including the agglutination test, were applied early in 1922 to herds in this commonwealth. The reacting animals were identified and removed with the result that many clean herds were established. The practices followed furnished the basis of procedures that became known as the Pennsylvania Plan of Prevention, Control and Elimination that was later accepted and became the basis for the federal-state cooperative plan employed in Pennsylvania since June 1, 1937. This plan was developed by the late Dr. M. F. Barnes, Chief, Laboratory Division of the Bureau, and his coworker, Dr. E. C. Deubler.

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Success in obtaining a clean herd depends upon the thoroughness employed in the application of certain fundamental principles, and is in direct proportion to facilities available and their utilization; namely, the blood test, good herd management or husbandry, sound sanitary practices, and vaccination as an aid or adjunct.

In February 1927, restrictions were placed on reacting animals, requiring their quarantine and permitting them to be moved only for slaughter under official supervision or their transfer to herds of a similar status. Since 1934, all reactor animals have been required to be identified with a special quarantine tag in addition to the letter B branded on the left jaw. Milk from reactor animals is required to be pasteurized.

Recommendations presented to the Department by a committee representing the dairy and beef cattle industries, association of artificial breeding cooperatives, including one veterinarian, and other allied agencies, indicated their interest in a united effort for the state and national brucellosis control plans. These are given in part as follows:

1. That the efforts of the Pennsylvania Bureau of Animal Industry be placed behind an expanded calf vaccination program, with less emphasis on slaughter of animals, until some immunity against the disease is acquired in the cattle herds of the state.

2. That a state-wide brucellosis control organization of farmers be set up with one delegate from each county committee. This organization should meet at least once a year to study the progress of the control program and assist the Secretary of Agriculture and the Bureau of Animal Industry in carrying out a state-wide program.

3. The state should supply dry vaccine (strain 19 and/or any superior vaccine developed), provide personnel to distribute the vaccine and vaccinate all calves under any calf vaccination plan.

4. Wherever vaccination is practiced, calves should be vaccinated between the ages of six and 12 months. The time for clearing of titer in vaccinated calves should be extended from 24 months to 36 months. (Subject to changes recommended by the USDA.)

5. Adult vaccination should be permitted in any infected herd under plans B, B-a, or C.

6. The Bureau of Animal Industry should provide personnel to carry out the brucellosis control program in Pennsylvania, even though technicians must be trained to draw blood and vaccinate where practicing veterinarians are not available.

7. The area test should be conducted by the Bureau of Animal Industry at least once a year.

8. Under plans A and A-a, where calf vaccinated animals fail to return to a negative status within 36 months, indemnity should be paid on these animals as on any other reactors.

9. A continuation of a control program, as now conducted, with indemnity paid by the federal and state governments for positive animals, with the provision that, except in A herds, no indemnity be paid after June 30, 1951 unless calf vaccination is being practiced.

Development of Plans

It is the belief of many that no control program, regardless of the painstaking effort that may go into its formulation, nor its soundness, will ever be successful unless it has developed the understanding (the part the cattle owner must play) and has the full cooperation of the livestock industry. No amount of professional opinion or federal and state legislation can be substituted for a sound, well organized educational effort. In other words, more education will tend toward less regulation.

The Department of Agriculture recognizes the importance and effectiveness of a county committee in its efforts to carry on a program for control and eradication of brucellosis among livestock.

In accordance with these views, and in compliance with the recommendations of the national brucellosis advisory committee and a representative group of Pennsylvania dairymen and breeders of beef cattle, the Department requested that a committee composed of not less than three nor more than seven members, to be known as the County Brucellosis Committee, be organized in each county of this commonwealth. To date, 67 committees have been organized and reported to the Department.

Representatives constituting this committee are selected from among a group of livestock producers, members of the various breed associations, veterinarians, and other agricultural interests within the county. The duties of the county committee are to assist in the organization and promotion of brucellosis control and eradication within their respective counties. They serve in an advisory capacity to official agencies of the program as it may pertain to their home county. The ultimate objective, a modified accredited brucellosis-free area, is kept in mind and active cooperation of all agencies is solicited.

A State Brucellosis Committee was organized with one delegate from each county committee. One representative from the state veterinary medical association attends all meetings.

The state committee meets at least once each year and such other times as may be necessary to effectively assist in the promotion of the program within the commonwealth. The first meeting of this committee was held March 21, 1950.

The responsibility of the Pennsylvania Agricultural Extension Service to the program, as approved by Director J. M. Fry, is, "It is understood that the extension service will accept the responsibility for conducting the educational phases of the program. This will include taking the initiative in the formation of the county brucellosis committee, counselling with the committee in the discharge of its functions necessary in the promotion of brucellosis control and eradication, and, with cooperation of the county committee, inform livestock owners and the general public of the details of the program and the objectives to be attained."

Vaccination

Following the presentation of a report by Dr. John R. Mohler, former chief of the U. S. BAI, on December 5, 1940, recognizing calf vaccination for the first time as a part in the cooperative brucellosis control program, and which was adopted by the U. S. Livestock Sanitary Association and endorsed by the American Veterinary Medical Association, calf vaccination was incorporated into the program in Pennsylvania March 1, 1941.

Calf vaccination offers recognized advantages and is recommended as a valuable aid in prevention and control.

Vaccination to be most effective should be employed in a plan combined with periodic blood testing of the herd, gradual or immediate elimination of positive animals, sanitation and good herd management.

It is unfortunate that some are inclined to seize an effective but limited weapon and cast aside all others, accepting this as the only method of dealing with the disease. These believe that they can relax the hitherto required effort on their part in carrying on with practices and procedures which are indispensable. Although good progress has been made previously in many areas, the program was enlarged to assure control and eventually eradication.

After January 2, 1950, the Pennsylvania Department of Agriculture provided calf vaccination service, to the extent permitted by available funds, for use in accordance with established plans and upon application of cattle owners. Farm visits for the purpose of administering vaccine are restricted to not more than six visits to an individual farm in any one year. Special forms may be obtained from the Bureau for the owner to complete in making application for vaccination service.

A permit for authorization to an accredited veterinarian selected by the owner for the vaccination of calves between the ages of six and eight months, and a special permit to vaccinate calves between eight and ten months of age, are issued upon receipt of application and required agreement from the owner. This procedure will not prevent an owner from employing an accredited veterinarian at his expense to vaccinate cattle under any of the approved plans, provided application is made in the usual way.

Vaccine Employed

The Department of Agriculture furnishes vaccine for all official vaccinations, including vaccine for calves of other than specified ages, and negative adult animals, but the owners are expected to compensate the veterinarian for the administration to these groups.

Sharp and Dohme, Inc., have been awarded the contract by the Department of Property and Supplies to supply lyophilized *Brucella abortus* vaccine for use in the program. The vaccine is supplied in single doses and furnished in cartons containing 30 doses; thus making it possible for the veterinarian to have vaccine on hand to facilitate the vaccination program.

The responsibility for having calves vaccinated at the proper age (six to eight months) shall rest solely upon the owner. The owner should call his veterinarian at least a week in advance of the time when calves to be vaccinated are of proper age.

Identification of Vaccinated Cattle

All cattle officially vaccinated are required to be identified with a legible tattoo "V" in the right ear, preceded by the number of the quarter of the year and followed by the last number of the year ("4V0"—vaccinated December 1950). The official ear tag shall be used also in the right ear of all vaccinated cattle, except purebreds that are registered at the time of vaccination. Such animals shall be recorded by name of the dam and date of birth. In addition, all animals vaccinated other than at the specified ages of six to eight

months, shall be tattooed in the right ear with the letters "AV" (adult).

Report of Vaccination

All vaccinations must be reported to the Bureau of Animal Industry, within seven days following vaccination. The reports are made in quadruplicate on forms provided by the Department. The original and copy are forwarded to the Bureau, one copy is given to the owner of the herd and one copy retained by the veterinarian.

Veterinarians order vaccine, agreements, applications and other forms as needed.

Payment to Accredited Veterinarians

All accredited veterinarians authorized by the Department and engaged in the vaccination of calves under the vaccination program receive compensation from the Department of Agriculture at the rate of $2.50 per herd visited, plus 25c for each calf vaccinated. Compensation is not paid until all required reports, in proper form, are received in the office of the Bureau of Animal Industry, Harrisburg, Pa.

To support approval for compensation, it is requested that veterinarians prepare vouchers in triplicate and forward with the copy of vaccination report retained, for each herd in which vaccine was administered.

Indemnity

Indemnity will not be paid for cattle vaccinated as calves which give a positive reaction to the blood test until 18 months after date of vaccination, nor for cattle that were not vaccinated as calves between the ages of six and eight months.

The voluntary brucellosis control and eradication program in Pennsylvania conforms to the national plan, and is conducted in cooperation with the U. S. Bureau of Animal Industry. Plans have been modified and revised on occasions to conform with our present knowledge of the disease, developed by research, and with methods and procedures that have been adopted by the U. S. Livestock Sanitary Association, and approved by the U. S. Bureau of Animal Industry, American Veterinary Medical Association, and upon consultation with representatives of the cattle industry in Pennsylvania and the Pennsylvania State Veterinary Medical Association through its Legislation Committee which met to consider the program October 19, 1949.

We are pleased to recognize the committee of the Pennsylvania State Veterinary Medical Association as an advisory committee to the Bureau, in dealing with matters of policy relating to livestock sanitary control work in which the veterinarian is vitally concerned.

Plan of Action

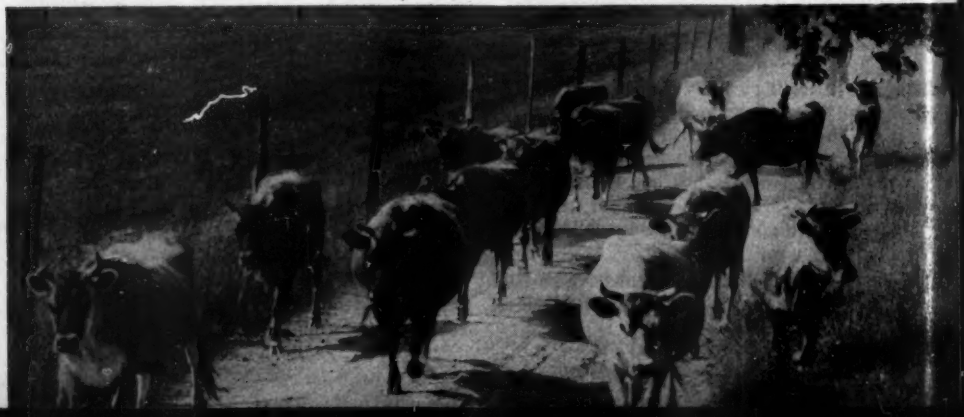
The various plans for control available at present have been changed very little, except that calf vaccination at state expense has been added to all plans.

1. Brucellosis-free Accredited Herd Pl The owner is required to complete an agreement and employ an accredited veterinarian, who, in turn, is authorized to collect and submit blood samples to the Pennsylvania Bureau of Animal Industry Laboratory for testing. Elimination by slaughter of positive animals and payment of indemnities.

Vaccination Under the Accredited Brucellosis-free Herd Plan

Plan A. Test and elimination by slaughter of positive animals, followed with calf vaccination and payment of indemnities.

Plan B. Test and gradual elimination by slaughter of positive animals as they become unprofitable, followed by calf vaccination and without payment of indemnities. Vaccination of negative animals in selected herds. Positive animals shall be branded and maintained under strict quarantine. This plan is not permitted in a modified accredited brucellosis-free area. Herds under this plan can be transferred to



plan A upon application, provided the herd has received one or more blood tests subsequent to adopting plan B, and all positive animals disclosed as a result of such tests have been disposed of for slaughter purposes without indemnity, and within 90 days of the last herd test.

Plan B-a. Provides for the vaccination of negative adult animals and calves, in selected herds, within ten days after all reactors are removed from the herd. The vaccine for adult vaccination is furnished free, but the owner shall compensate his veterinarian for the vaccination service. The owner shall dispose of vaccinated reactors under permit four years following the date of vaccination.

Plan C. Provides for calf vaccination without periodic blood testing of the herd. However, the owner is expected to make application for plans A or B when sufficient vaccinated animals become available to replace the original herd.

2. Modified Accredited Brucellosis-free Area: This plan provides for the blood testing, quarantine, branding and slaughter of positive animals under official supervision, after 90% or more of the herd owners in a county complete agreements for the testing of their cattle under the area or accredited brucellosis-free herd plan. The initial test of the cattle in a township under the area plan is not conducted until the entire county has qualified for test. The county is the unit for test.

Vaccination Under the Modified Accredited Brucellosis-free Area Plan

Plan A-a. Test and elimination by slaughter of positive animals, followed with calf vaccination and payment of indemnities. Under this plan the entire herd is tested, and blood samples collected by an accredited veterinarian or veterinarian employed by the cooperating departments.

Plan A. As provided for under the accredited brucellosis-free herd plan. (Test and slaughter, calf vaccination and indemnities.)

Plan B. Permitted in problem herds under the accredited brucellosis-free herd plan in tested and quarantined areas other than a modified accredited brucellosis-free area. Reactors shall be disposed of within three years. When percentage of infection within the area (county) has been reduced to 2% or less, all reactors under quarantine shall be disposed of within six months after notification.

Plan B-a. Permitted in problem herds located in tested and quarantined areas, including a modified accredited brucellosis-free area, in accordance with agreement and rules provided under the accredited brucellosis-free herd plan.

The collecting of blood samples as may be required under plans A, B and B-a or desired by the owner will be authorized and assigned to an accredited veterinarian employed by the owner.

Animals vaccinated as calves at specified ages are not considered reactors until reaching 30 months of age. When considered for interstate or intrastate herd transfer, they shall be considered reactors after reaching 24 months of age.

All brucellosis infected herds are placed under quarantine and retested at intervals of from 30 to 90 days, until all cattle have passed two consecutive negative tests and another negative test not less than six months from the date of the second negative test.

Uniform plans, now available, provide more uniform methods, procedures and regulations governing the control work.

It is unfortunate that some cattle owners and veterinarians yield to the temptation to practice promiscuous vaccination and secret blood testing, instead of becoming informed and accepting generally approved plans and procedures based on principles which are known to be essential and that have proved to be effective in control and elimination.

The service offered by accredited veterinarians in Pennsylvania has always been recognized as indispensable in the work of disease eradication. They have an opportunity to serve, as well as a responsibility to properly enlighten cattle owners relative to the nature of the disease, and offer advice and encouragement to those interested in the propocition of disease control and eradication in their herds.

The writer wishes to express his sincere appreciation to the U. S. Bureau of Animal Industry for its capable and efficient cooperation and its splendid contribution in connection with the brucellosis control program.

Even though brucellosis eradication from the animal population is a formidable undertaking, it can and will be accomplished through the well directed and intelligent cooperation and support of the livestock industry, accredited veterinarians, public health officials, agricultural extension service and other allied agencies.

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Advances made in the treatment and control of animal diseases during the past decade are integrated with the research and experience with antibiotics.

Actinobacillosis In Cattle*

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A THREE-YEAR-OLD red Shorthorn cow was presented to the Kansas State College Veterinary Clinic for diagnosis and treatment. According to the history given by the owner, the cow had been afflicted with "warts" five months previously. These growths had disappeared spontaneously by the time the owner next saw the cow and at this time her hind legs were slightly enlarged. This enlargement increased over a period of three months, at the end of which the animal was presented for treatment. (Fig. 1.)

Upon examination, the cow seemed perfectly normal and healthy, except for the above-mentioned condition. Her temperature, pulse, respiration, appetite, and general condition were normal. She was negative to the brucella agglutination and tuberculin tests.

Both posterior limbs were enlarged; the left more so than the right. This enlargement extended from the extremity of the foot to the middle of the thigh. Palpation disclosed a thickened skin and subcutaneous tissue, which contained many small nodules. The prefemoral lymph glands were enlarged to a diameter of approximately three to five inches. Lymphatic vessels in the region of the mammary gland could be palpated very easily and their course followed. Supramammary lymph glands were easily palpable and were found to be enlarged and soft.

Biopsy was performed to collect material for pathological and bacteriological studies. The right prefemoral lymph gland and specimens from the subcutaneous tissue immediately dorsal to the mammary gland were removed surgically. Subcutaneous tissue was edematous, thickened, and fibrotic, with numerous pea-sized (2 to 5 mm.) nodules scattered throughout. On incising these small, circumscribed nodules, a drop or two of pus could be expressed from each. With sterile technic and equipment, pus was aspirated from the affected supramammary lymph glands. This pus appeared similar to that found in the lymph glands incised when treating actinobacillosis in the region of the head. It was cream-colored or yellowish-tinged, tenacious, mucoid, and nonodorous.

Fig. 1. Enlarged left hind leg of Shorthorn cow. The skin over the grossly affected area was thickened, and small nodules were palpated in the subcutaneous tissue.

Laboratory Examination

The prefemoral lymph gland and portions of the subcutaneous tissue were examined bacteriologically. The lymph gland was immersed in boiling water for approximately one minute, removed, and the line of incision seared with a hot iron. Sterile instruments were used to open the lymph gland and obtain representative portions of tissue. This material was taken from the actively growing hyperemic areas and

*This paper was submitted by Doctor Palotay while a senior student at Kansas State College, Manhattan, as his entry (winning 3rd place) in the 1950 contest sponsored by VETERINARY MEDICINE.

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placed in sterile Petri dishes to await inoculation into proper media. Representative nodules in the subcutaneous tissue were obtained and treated in a like manner.

Shake cultures of bacto-brain-heart infusion medium containing 1½% agar were inoculated with material removed from the prefemoral lymph gland and subcutaneous tissue. Blood agar plates and plates of Sabouraud's agar were also inoculated. The above media were used in order to insure growth of either aerobic or anaerobic organisms as well as pathogenic fungi, should they have occurred. There was evidence of good growth in the shake cultures and on the blood agar plates within 24 hours. Small white colonies, which had a tendency to adhere to the media, were evenly distributed throughout the depths of the shake cultures. The growth on blood agar plates was in the form of small, bluish-grey colonies which did not show evidence of hemolytic action. No evidence of growth was apparent on Sabouraud's agar after two weeks' incubation.

A gram-negative organism, which was pleomorphic, varying from short diplococci to long s-shaped forms, was isolated. Typical colonies were transferred to tubes of Brewer's sodium-thioglycollate broth which contained 1% dextrose. After luxuriant growth was obtained, tubes of sugar-free thioglycollate broth were inoculated. The resultant cultures were used to inoculate various media employed in the determination of biochemical activity.

Slides from portions of the lymph gland and subcutaneous tissue were prepared. Examination disclosed that the pathological pictures were similar in both instances. Each consisted essentially of a granulomatous process encapsulating a reactive area. There was an outer zone of granulation tissue surrounding an area of leukocytic infiltration with scattered rosettes in the center. (Fig. 2.) Rosette formation was found to be associated with the tissue reaction in each of the organs that contained pus. The fibrotic encapsulation was probably the reason for the nodular appearance and texture. Diagnosis: Generalized actinobacillosis due to invasion by the organism *Actinobacillus lignieresi.*

Autopsy

The animal was destroyed and postmortem examination revealed infection of other tissues. The internal iliac lymph glands contained thick, cream-colored, tenacious, nonodorous, mucoid pus. The submaxillary lymph glands, as well as the ovaries, were affected in the same manner. Pus from these structures was examined after treatment with 5% sodium hydroxide, and rosette formation was demonstrated. Slides were prepared from these organs obtained at postmortem, and the histopathological picture was essentially the same as that found in the organs obtained by biopsy.

Two Other Cases

A small, ten-month-old Holstein bull, upon which castration had been started by the owner, was presented at the clinic for treatment. When

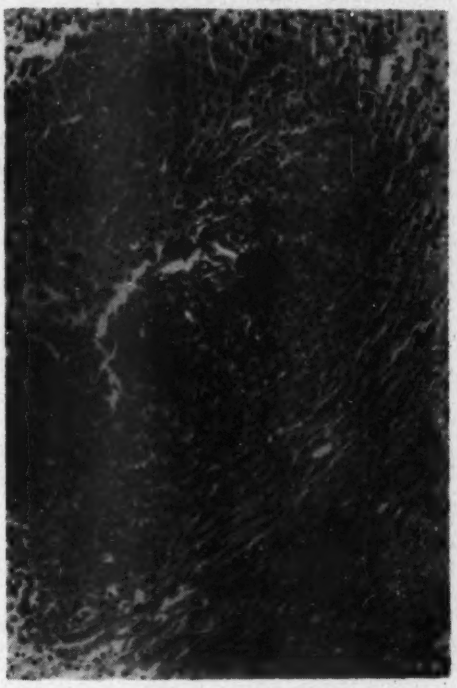

Fig. 2. Photomicrograph showing rosettes, cellular infiltration and encapsulation.

the owner incised the bottom of the scrotum, pus flowed from the wound. He ceased operations and brought the bull to the clinic for diagnosis and completion of castration. Upon examination it was found that there were adhesions between the scrotum and both testicles. The testicles were removed and used for bacteriological and pathological studies. The pathological processes were the same in these testicles as in the subcutaneous tissue of the Shorthorn cow. Both testicles were somewhat enlarged; the tunics and musculature of the testicles were studded with hard, circumscribed nodules approximately 2 to 5 mm. in diameter, each of which contained a drop or two of pus. Bacteriological examination yielded a pure culture of a gram-negative organism having the same

morphology and biochemical reactions as those described above.

A Shorthorn steer was presented at the clinic for examination, with extensive swelling of the posterior surface of the right hind leg above the hock joint. Swelling was circumscribed with a very thick, firm capsule. Exploratory puncture with a needle disclosed a thick, tenacious, nonodorous, yellowish-tinged, mucoid pus. The bacteriological studies showed this pus to contain a gram-negative organism identical with the two previously described cases.

Literature

Actinobacillosis as a separate entity has been generally overshadowed by the use of the term actinomycosis to include lesions of the soft tissue and bones in the region of the head. Vawter[9] suggests that the work of Lignieres and Spitz[6] has not received the attention it warrants. He points out that the term actinomycosis is customarily used in a nonspecific manner and does not necessarily mean an infection by *Actinomyces bovis*. He further suggests that the terms actinobacillosis and actinomycosis should be applied to their rightful disease entities.

Shahan and Davis[8] are of the opinion that the tissue and cellular reactions are the same and afford no means of exact differentiation, but the organisms differ culturally. Shahan and Davis, as well as Plummer,[7] are of the opinion that *Actinobacillus lignieresi* is at the present time the only gram-negative organism associated with rayed-clubs or rosette formation.

That actinobacillosis, when it affects the lymph glands and internal organs, can be mistaken for tuberculosis is evidenced by the study made by Davies and Torrance[3] in which they state, "In certain cases it is impossible to distinguish actinobacillosis from tuberculosis without a microscopical examination; a definite diagnosis has a practical bearing on meat inspection."

Beaver[1] describes a case of actinomycosis of the omentum in which he found small rounded nodules 1 to 3 mm. in diameter with a thick outer capsule, and caseous material without calcification within. He did not culture these lesions but suspected them to belong to the genus Actinomyces or to be closely related. He stated that Kitt[5] referred to the condition as actinomycosis nodularis disseminata. He also called attention to the possibility of confusing omental actinomycosis with omental tuberculosis, or pearl disease.

Damman[2] reports on a condition in feed lot steers resembling the first case described in this report, in which he found that "the hind legs were swollen up as large as any 'lymphangitis leg' of a horse."

Hutyra and Marek[4] make reference to a case described by Gulyas in which the same picture presents itself; that of a swollen hind leg, hard and nodular on the surface, the subcutaneous tissue of which contained nodules the size of a hazel nut. The lymphatic system in that region was involved in a like manner.

Discussion and Conclusion

The presence of a gram-negative organism, which is fundamentally the same, biochemically, as that described by Vawter,[9] associated with rosette formation, is highly indicative of infection by *Actinobacillus lignieresi*.

From the foregoing, it may be concluded that actinobacillosis is by no means a new disease, but often has been described under the misnomer or blanket term of actinomycosis. Also, actinobacillosis is not limited to the region of the head and neck, but may involve almost any gland or organ in the body, and may even become generalized. It is, therefore, one of the bacteria associated with suppuration in various locations in the bovine.

Summary

Three cases of actinobacillosis in cattle have been described. One affected the subcutaneous tissue of the posterior limbs, submaxillary, internal iliac, and prefemoral lymph glands, as well as the ovaries. Another involved the tunics of the testicles, and the third was evidenced by a large swelling in the middle posterior part of the thigh.

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Tissue fluid levels of chemotherapeutic agents may be expected to be higher than blood levels and to last longer.

Vaccination Against Pneumoencephalitis (Newcastle Disease) By Atomization Or Nebulization With The B_1 Virus

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SINCE the development of the intranasal vaccine for prevention of Newcastle disease of fowls by Hitchner and Johnson[1] considerable work has been done to learn more about the B_1 virus and to test, further, atomization as a method of administering the vaccine. First attempts at vaccination by atomization with this vaccine were carried out in the laboratory and resulted in high morbidity and high mortality. These unfavorable results discouraged further attempts by this method for several months. Extensive use of the vaccine by the intranasal-drop method involving over a million chicks, were so uniformly successful, however, that the writers were prompted to retest the atomization method in an effort to determine how, if it failed, did it differ. If this method could be successfully developed it would mean a considerable saving in time and expense of handling the chicks for vaccination. The experiments related in this paper indicate encouraging possibilities in the use of this method.

Experimental Procedure

All chicks used in these experiments except those that were atomized in the field and brought in to be challenged, were obtained from the poultry department of this institution. There has been no history of pneumoencephalitis in any of these flocks and the tests that have been made from time to time, as well as the autopsy records on all birds that have died, have indicated no evidence that it has occurred on the poultry department premises at the Virginia Polytechnic Institute. The only significant deviation in the procedure used from that employed in the earlier trials which were unsuccessful, was that in place of bringing the chicks to be atomized into the laboratory they were taken directly out to the virus-isolation building and the atomization was done there under conditions of as nearly complete isolation from other viruses as seemed practicable. In most instances the chicks were atomized in groups of 25, either in single boxes of this capacity, or in 100-chick-size boxes having four compartments for 25 chicks each. For the most part, the chicks were from 24 to 48 hours' old when atomized but a few older birds have also been done. The vaccine used was from the same lots as that which was used intranasally with good results. The atomizer was an ordinary type with screw-on glass container of approximately 10 ml. capacity known as a DeVilbiss no. 114, equipped with a rubber bulb and recommended for atomizing the nasal passages and throats of human beings.

The atomization was done through the holes on two sides of the chick-box compartment, leaving the top holes unpunched. At first it was thought that a definite number of squirts for each compartment would be most accurate but it was found that the amount of vaccine delivered per squirt varied considerably and, therefore, on the basis of these tests it appears that from 2 to 2.5 ml. of vaccine per 100 chicks when given in four compartments of 25 chicks each is a satisfactory amount of vaccine to use. The chicks were left in the boxes for five to ten minutes after atomization before being placed in the brooder.

In the two final experiments a no. 40 DeVilbiss all-glass nebulizer was used. Nebulizers differ from atomizers in that they produce a mist instead of a spray. The nebulizer appears to have two advantages. One is that the mist produced remains in the air surrounding the chicks longer than the spray produced by the atomizer and because of this there is less possibility for any chicks to escape being vaccinated. The other is that it requires only about half the volume of vaccine. In one of these experiments regular vaccine made from entire embryos was used and in the other allantoic fluid diluted with buffered saline was used so that the volume of vaccine per egg was equal to that which was made from entire embryos.

Two virulent strains of Newcastle disease virus were used for challenging the vaccinated chicks. One was the neurotropic California strain no. 11914 which is referred to as N_2.

*Virginia Agricultural Experiment Station, Section of Animal Pathology, Blacksburg.

The other was a highly neurotropic and pathogenic strain received from Dr. W. A. Boney, Jr., Texas A. and M. College. This is referred to as GB. All challenging was done by intramuscular injections of 0.05 ml. per chick of amnioallantoic fluid titering $0.1 \times 10^{-8.3}$ and 0.1×10^{-9} embryo $l.d._{50}$.

Experimental Results

The data for the experiments described below are summarized in table 1.

Experiment 1. Eight, day-old, chicks received from the V. P. I. Poultry Department were atomized on January 30, 1950, with the B_1 vaccine. There were no unusual symptoms during an observation period of 17 days in these chicks. On February 16, 1950, they were challenged by an intramuscular injection of 0.05 ml. a.a. fluid containing the N_2 virus. Three unvaccinated control chicks were similarly challenged. The control chicks developed typical nervous symptoms and died on the third and fourth days, while none of the eight atomized chicks developed nervous symptoms or died.

Experiment 2. On February 16, 13, day-old, chicks from the poultry department were atomized as previously described. No symptoms developed except slight hoarseness on sixth and seventh days. Twenty days later or on March 8, these chicks, as well as three unvaccinated controls, were challenged with the N_2 virus. None of the treated chicks developed Newcastle disease while two of the three controls developed symptoms two and four days, respectively, after challenge.

Experiment 3. On March 7, 60 similar chicks were atomized as previously described. Three birds were lost due to chilling and injury during the 22 days before challenge but no serious reaction from the vaccination was noted. On March 29, the 57 remaining chicks were challenged with the GB strain of Newcastle disease virus. None of the atomized birds revealed symptoms of Newcastle disease during the 19 days which they were kept after challenge. Ten (all) of the unvaccinated controls similarly challenged developed Newcastle disease on the second, third, and fourth days after challenge.

Experiment 4. On March 29, 60 chicks from the same source were atomized. During

TABLE 1. RESULTS OF CHALLENGING DAY-OLD CHICKS ATOMIZED OR NEBULIZED WITH B_1 VACCINE

Exp. No.	Date acq.	Source	Vac. status parent stock	Time before hatching	Age at challenge (days)	Challenge virus	NCD/ No. birds	Controls
1	1950 1/30	V.P.I.† Poultry Dept.	Not vac.	——	17	N_2	0/8	3/3
2	2/16	V.P.I. Poultry Dept.	Not vac.	——	20	N_2	0/13	2/3
3	3/7	V.P.I. Poultry Dept.	Not vac.	——	22	GB	0/57	10/10
4	3/29	V.P.I. Poultry Dept.	Not vac.	——	16	GB	5/59*	3/3
					19		0/5	2/2
		V.P.I. Poultry			23	N_2	0/12	4/4
5	4/20	Dept.	Not vac.	——	30		0/12	5/5
					37		0/9	5/5
					123	N_2	1/9	2/2
6	5/31	V.P.I. Poultry Dept.	Not vac.	——	92	N_2	0/6	2/2
7	7/12	V.P.I. Poultry Dept.	Not vac.	——				
8	8/3	V.P.I. Poultry Dept.	Not vac.	——	28	N_2	0/8	2/2
9	9/13	V.P.I. Poultry Dept.	Not vac.	——	14	N_2	0/10	4/4
10	9/13	V.P.I. Poultry Dept.	Not vac.	——	14	N_2	0/10	4/4
11	5/20	Commercial Flock	Wing-web vac.	8 months	23	N_2	2/10	5/10
		Commercial	Wing-web at 8		23	N_2	5/20	2/2
12	6/15	Flock	weeks of age	Unknown	33	N_2	5/20	4/4
13	8/4	Commercial Flock	NCD	12 months	22	N_2	1/16	2/2

* Box used for atomization was too small so that some of the birds may have failed to come in contact with the vaccine.

†V.P.I. = Virginia Polytechnic Institute

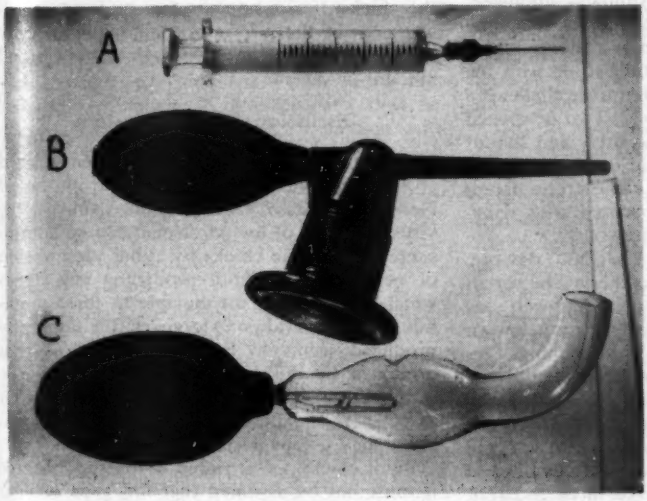
the ten days before challenge one of the chicks died as the result of crowding, but no severe reactions resulted from the vaccination. On April 14, the 59 remaining chicks were challenged with the GB virus. Five developed Newcastle disease on the third and fourth days. Three out of three unvaccinated controls similarly challenged developed symptoms on the third and fourth days. It is possible that the five chicks that died did not become immunized because the crowded condition and short time they were held in the atomization box did not allow for vaccine contact. Also, these birds were held in the box for only four minutes.

Experiment 5. On April 20, 60 similar chicks were atomized. Eleven birds were lost during the first three weeks due to chilling and crowding. One was lost after 110 days with neural lymphomatosis. There was no severe reaction attributable to the vaccination. Eighteen days after vaccination five were challenged with N_2 virus. None of these developed Newcastle disease while two unvaccinated controls similarly challenged died on the second day. At 23 days, 12 were similarly challenged and none developed Newcastle disease while four of four controls became infected on the third and fourth days. At 30 days, 12 were challenged as before and none developed Newcastle disease while all controls developed symptoms on the second and third days. At 37 days, nine were challenged and none developed Newcastle disease while five of five controls developed the disease on the second and third days.

The remainder were held to determine their hemagglutination-inhibition (HI) titers at various times after vaccination. These were challenged at 123 days with the N_2 virus. One bird developed slight incoordination of the head. Two of two unvaccinated controls developed Newcastle disease on the second and third days.

Experiment 6. On May 31, 40 similar chicks were atomized. Two were lost in brooding and 32 were used in another experiment. The two losses were not attributable to the vaccination. The six remaining birds were challenged with the N_2 virus at 92 days of age. None of the atomized birds developed Newcastle disease while two of two unvaccinated controls did on the third and fourth days.

Experiment 7. On July 12, 19 similar chicks were atomized. These chicks were kept for HI antibody determinations and none has been challenged, and none has shown adverse reaction as the result of the atomization.



(A) 5 cc. Luer syringe; (B) No. 114 DeVilbiss atomizer; (C) No. 40 glass nebulizer.

Experiment 8. On August 3, eight chicks from the poultry department were similarly atomized. No severe reaction was noted following vaccination. Twenty-eight days later these, as well as two unvaccinated controls, were challenged with the N_2 virus. None developed symptoms of Newcastle disease while both controls developed nervous symptoms and died, one on the third and one on the fourth day following the challenge.

Experiment 9. On September 13, 25, day-old, chicks were nebulized. Over a period of ten minutes 0.2 cc. of vaccine was used. The vaccine was of a regular type made from entire embryos diluted 1:5 in buffered saline and had an embryo $l.d._{50}$ of $0.1 \times 10^{-5.4}$. At 14 days

of age ten of these chicks and four unvaccinated controls were challenged with N_2 virus. None of the nebulized chicks but four of four unvaccinated controls developed symptoms of Newcastle disease on the third and fourth days after challenge.

Experiment 10. Another group of 25 chicks from the same source were similarly nebulized on September 13. The vaccine used in this case was 5% allantoic fluid, obtained from embryos inoculated with B_1 virus, in buffered saline. The embryo $l.d._{50}$ of this vaccine was $0.1x10^{-6.7}$. Ten of these were challenged as in experiment 9. None of the nebulized chicks but four of four controls developed symptoms of Newcastle disease on the third and fourth days, after challenge.

Experiment 11. On May 20, 25 chicks supplied by a hatchery were similarly atomized. Fifteen were lost by chilling during brooding as the result of an improperly adjusted heat lamp. These losses had nothing to do with the vaccination. The remaining ten were challenged 23 days later with the N_2 virus. Two developed Newcastle disease on the third day and five of ten unvaccinated controls did on the third and fourth days. These chicks came from parent stock which had been vaccinated with wing-web vaccine eight months previously.

Experiment 12. On May 23, 500, day-old, chicks were atomized by a hatchery. The parent stock had been vaccinated with wing-web vaccine at eight weeks of age but it is not known how long this was before the hatching eggs were laid. Twenty of these were challenged at 23 days of age with N_2 virus. Five atomized birds and two of two unvaccinated controls developed Newcastle disease on the third and fourth days. Twenty others were challenged at 33 days of age. Five atomized birds and four of four controls developed Newcastle disease on the third, fourth, and fifth days.

Experiment 13. On July 18, 2,850, day-old, chicks were atomized at a hatchery. Some of the parent stock had been through Newcastle disease and some had been vaccinated with wing-web vaccine. Sixteen of these atomized chicks were challenged at 22 days of age. One atomized bird and two of two unvaccinated controls developed Newcastle disease.

Atomization with India Ink in an Effort to Trace the Vaccine

In an attempt to find out approximately how much of this vaccine was being inhaled when chicks were atomized and how far into the respiratory passages it was going, Higgin's India ink was used in some lots of vaccine and then sectioned and stained tissues from some of the chicks atomized with this mixture were studied. Approximately one part of ink to nine parts of vaccine was used. From five to ten minutes after the atomization the chicks were killed and the nasal passages, trachea and lungs were removed and fixed in 10% formalin solution. After the usual procedure of dehydration in graded alcohols the tissues were embedded in paraffin, sectioned, and stained with azure II plus eosin. Subsequent microscopic examination of the stained tissues revealed small deposits of ink in the respiratory tract epithelium as far as the primary bronchi. These deposits of ink were minute, indeed, and certainly any amount of vaccine with it would be small.

On the basis of these observations, however, it appears that at least a small portion of the vaccine, when atomized, reaches the lungs of the chicks. It also appears that quite an extensive area of the respiratory epithelium is contacted by the vaccine although a very small amount of vaccine is inhaled.

Discussion and Conclusions

The experiments which have been related give conclusive evidence that the intranasal Newcastle disease vaccine made from the B_1 virus, which is of low virulence, can be administered to day-old chicks by either atomization or nebulization without producing any losses which appear to be attributable to these methods of administration. Moreover, the immunity produced seems to be just as solid as that produced by this vaccine when given by the intranasal-drop method. Since it was shown in at least two experiments that an occasional chick may escape successful vaccination, especially if chicks are crowded in too small a box, it must not be assumed that this type of vaccinating can be done haphazardly. If carefully done, however, it appears that it can be done safely and with a considerable saving in time and labor of handling the chicks.

The method opens up enormous potentialities which must be tried out before one can actually say that it can be done successfully. Numerous ingenious methods will no doubt be tried out now that it has been demonstrated that this method can be used without producing additional mortality. Among these, atomization and nebulization should be tried in forced draft incubators. It is quite likely that this can be worked out successfully so that the chicks could be vaccinated before they are removed from the incubator. It would no doubt be better to use a separate incubator for this purpose and, better still, to use a special room for doing the vaccinating.

About the time the last experiments were being completed a paper by Bankowski[2] dealing with atomization when using an *in vitro* cultivated strain of pneumoencephalitis virus appeared. In his work he used the California no. 11914 strain of virus after attenuating it by serial passage *in vitro* through 50 generations, using Simms-Sanders' medium. In his experiments older birds were used but even with this virulent strain it was possible to attenuate it sufficiently to use it in this manner without producing high morality. He also used a Well's type reflux atomizer and considerably more expensive equipment. Since our work has shown that the B_1 virus can be used in atomization and nebulization of day-old chicks without producing increased morbidity or mortality this vaccine could no doubt be used with good results in a Well's atomizer. It is hoped that hatcherymen will take up this method cautiously and on a small scale at first and that they will realize that if the chicks pile up under crowded conditions that some may escape vaccination. If done properly it is believed that this method of vaccination with vaccine made from the B_1 virus can be successfully adapted to use on a large scale with considerable saving in time and expense of handling the chicks.

Summary

Thirteen separate experiments were carried out with groups of chicks from 24 to 48 hours' old to determine the safety of atomization and nebulization with vaccine made from the B_1 Newcastle disease virus, which is of low virulence. The groups of chicks ranged in numbers from eight to 2,850. No losses were attributable to this method of vaccination. The resulting immunity compared favorably with that produced by this virus when administered by the intranasal-drop method on chicks from the same source and under similar conditions. This method has enormous potentialities for vaccination of baby chicks with vaccine made from the B_1 virus on a large scale with considerable saving of labor and expense in handling the chicks.

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Factors Influencing the Properties of Desiccated Brucella Abortus Vaccine*

W. F. VERWEY, N. H. HARRINGTON, and CLARA MATT,** Glenolden, Pennsylvania

The fact that more than one-fourth of the *Brucella abortus* vaccine (strain 19) which is used in the United States is the lyophilized vaccine makes it important to know something of its preparation and properties. This research was directed toward the study of factors affecting the viability of Brucella organisms during the desiccation of the vaccine and those influencing their stability.

The lyophile process consists of three distinct steps: (1) the rapid freezing of the vaccine, (2) the removal of water from the frozen vaccine under conditions of greatly reduce pressure, and (3) the sealing of containers to prevent the re-entrance of moisture. In the procedure as it is applied in our laboratories, approximately 40% of the originally viable bacteria survive the lyophilization process and the initial number of bacteria in the vaccine is adjusted so that the number surviving exceeds the minimum requirements for Brucella vaccine of the Bureau of Animal Industry.

Studies that have been carried out indicated that the freezing of the vaccine caused only minor losses in viability, and that the desiccation step was the point of major loss. Examination of this procedure demonstrated that desiccation at relatively high residual pressures for minimal periods of time produced the most satisfactory results. Also, it was found that the amount of residual moisture within the range of 0.1% to 1.2% had no effect upon the number of organisms surviving the desiccation process.

Since procedures producing maximum recovery of viable bacteria after processing are not identical with those causing maximum stability during storage, the conditions necessary to obtain a stable vaccine were investigated. It was found that stability during storage and resistance to adverse conditions of temperature were determined largely by opportunities for interaction between moisture and the lyophilized vaccine. Therefore, the selection and sealing of containers is probably the most important single factor influencing the long-term stability of the vaccine.

Although the all-glass sealed vial provided the best conditions for stability, vials sealed

(*Continued on page* 61)

*Abstract of paper presented at the Third Inter-American Congress on Brucellosis, Washington, D.C.

**Sharp & Dohme, Inc.

Instances Of Reproduction With Uterus Unicornis And Uterus Didelphys*

PAUL B. DOBY,** D.V.M., Fayetteville, Arkansas

UTERUS unicornis and uterus didelphys as abnormalities of the reproductive tract have been reported at various times. The condition of a single uterine horn has been reported in several cows by Williams,[5] in a bitch by Higgins,[4] and in a large group of inbred heifers by Williams and Fincher[3]. The double uterus in which there are two distinct cervices has been reported by Williams and Fincher,[3] and by Fincher[1,2].

Williams[5] reported finding several slaughter house specimens of uterus unicornis that had been pregnant. Fincher[2] describes a case of uterus didelphys which was known to have carried a fetus to term.

Report of Cases

Case 1. This animal was a grade Holstein cow about six years of age that had been artificially bred five times over a period of eight months and for three months subsequently had been exposed to pasture service. The cow was a member of a large herd and detailed information relative to calving was not available due to frequent changes in the personnel in charge of the herd. It was known, however, that she had not calved within the past two years, but had been in lactation during part of that period.

A single uterine horn was disclosed by rectal examination. This was confirmed by subsequent slaughter and examination of the genital organs. (Fig. 1 and 2.) The vagina, cervix, and single uterine horn all appeared normal. The cervix, A, (fig. 2) outlined by the arrows was in direct connection with the cornua. Two ovaries were present, each adjacent to a fallopian tube. The left ovary, O, appeared normal and showed signs of ovulation within the past few days. Its fallopian tube, B, was in normal apposition with respect to the ovary, but terminated in a cyst, C, which appeared to be the remains of the left uterine horn. This cyst was filled with a clear, thin liquid. Its wall was thin and smooth inside and out, and ap-

Fig. 1. Uterus unicornis showing cervix and single uterine horn. Both ovaries and fallopian tubes present with left terminating in large cyst.

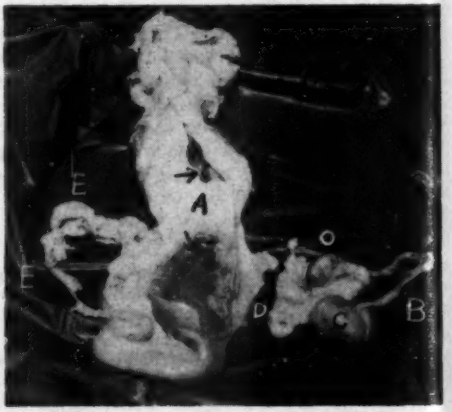

Fig. 2. Uterus unicornis with lumen of uterine horn and extremities of cervix exposed.

*Research paper no. 938 Journal series, University of Arkansas. Published with the permission of the director of the Arkansas Agricultural Experiment Station, Fayetteville.

**Department of Animal Industry and Veterinary Science.

peared to be smooth muscle tissue although no section was obtained. There was no other opening to the cyst other than from the fallopian tube. Apparently the cystic fluid did not enter the fallopian tube. The division, D, in the apparent broad ligament failed to show any connection other than attachment to the mature horn.

The right ovary and fallopian tube, E-E, which apparently were normal at one time, due to the fact that the cow had calved, showed extensive adhesions to surrounding connective tissue. The ovary was completely enveloped in adhesions. It contained a cystic corpus luteum and a fairly large follicle. The right fallopian tube was covered with a thick layer of connective tissue.

Case 2. This was a grade Jersey cow about five years of age. Available history revealed absence of previous breeding difficulty or dystocia. The cow had been bred artificially several times by the intrauterine method. During the period of time she was being bred there was a change of inseminator. The last inseminator discovered on his second service that the cow had two cervices. Vaginal examination with speculum and light showed two distinct cervices to be present, each in line with the other on a lateral plane. They appeared to be about 1½ inches apart.

Rectal examination showed the two uterine horns to be completely separate and distinct in so far as was detectable. If there was any connection, it was only loose connective tissue. The two cervices appeared to be approximately equal in size. The right cornua, however, was noticeably larger than the left. The difference in size was about the variation usually found between a virgin heifer and a cow after the second or third parturition. The ovary on each side appeared normal both in texture and position. Soon after this examination the cow was again bred, at which time she conceived. The inseminator had, after finding the two cervices, deposited equal amounts of semen in each cervix.

The cow was examined twice during pregnancy, once at about 60 days and again at 120 days, and pregnancy was found to be progressing normally. She delivered normally at term.

The cow was pregnant in the right horn. The left horn showed no change in size and fetal membranes were not detectable at either of the pregnancy examinations.

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Factors Influencing the Properties of Desiccated Brucella Abortus Vaccine

(*Continued from page* 59)

with a rubber stopper covered by an aluminum cap also permitted good stability and were more economical and convenient. The results demonstrated that Brucella vaccine in such vials met the minimum requirements of the Bureau of Animal Industry for at least a year when stored under refrigerated conditions. The majority of lots tested met these requirements for at least two years. Although comparatively few samples of production lots of vaccine have been stored at high temperatures, results indicated that the vaccine could withstand at least three months at room temperatures, six weeks at 37 C., and two days at 50 C. Non-refrigerated conditions of transportation and storage are not to be recommended, but it would appear that the level of stability is adequate to permit the use of the desiccated vaccine under almost any conditions that are to be expected in the field.

Studies have been carried out also to determine the vitality of the viable cells after restoration from the desiccated state. These experiments indicate that the viable organisms in lyophilized vaccine have not suffered any serious physiologic damage, and, when resuspended, exhibit stability of the same order that is obtained with fresh liquid vaccine. This suggests that when adequate conditions for refrigeration are available, the lyophilized vaccine could be restored beforehand in order to facilitate immunization in the field.

The lyophilization process has added considerably to the stability and, hence, the reliability of *Brucella abortus* vaccine. Moreover, the properties of the lyophilized vaccine are such that the distribution of this material in multiple dose containers could be considered. Such a procedure would be convenient, safe, and more economical.

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At a meeting of the American College of Surgeons, Drs. C. E. Friedgood and C. B. Ripstein announced that furacin, a furfural derivative, is capable of ACTH-like action in stimulating the adrenal gland.

150 Years Of Progress In Veterinary Science

DR. W. R. WOOLDRIDGE,* M.R.C.V.S., London, England

MORE than 150 years ago the first definite move was made in Britain to establish colleges for the training of veterinary surgeons. In those days all the students were men; later women began to enter the profession, but their main interest was small animals.

The first college, now known as the Royal Veterinary College, was established in London in 1791. Thirty-two years later a second college was opened in Edinburgh. These two colleges continued to grant certificates of competency to practice the veterinary art until 1844, by which time there were about 1,000 qualified veterinarians in practice. In that year, the Royal College of Veterinary Surgeons was formed. In those early days, the course of study for the membership diploma covered two sessions, following a period of apprenticeship, and ended with a practical test. During the next 50 years the professional examinations were widened in scope and by the close of the century the course had been extended to four years, with an examination (written and practical) at the end of each year. In 1932, the five years' course was instituted.

By 1900, the number of centers where a recognized veterinary training could be obtained had increased to five; London, Edinburgh, Liverpool, Glasgow, and Dublin; each of these cities had a college affiliated to the Royal College of Veterinary Surgeons, which constituted the examining body. Three universities offered a degree course in veterinary science. The degree was an extra qualification; it did not, by itself, qualify a man to practice.

A class of veterinary students in progress at the University College, Liverpool.

The following shows the syllabus for the five years' M.R.C.V.S. (Member of the Royal College of Veterinary Surgeons) course.

First Examination. (1) Chemistry and physics; (2) biology (botany and zoology); (3) animal management. (This examination to be taken before a student is presented for either part of the third examination.)

Second Examination. (1) Anatomy, including histology and embryology; (2) veterinary physiology (including biochemistry); (3) prin-

*Member of the Royal College of Veterinary Surgeons and Scientific Director of the Animal Health Trust of Great Britain; general secretary of the 14th International Veterinary Conference in London in 1949.

ciples and practice of veterinary pharmacology; (4) materia medica and pharmacy. (This examination to be taken before a student is presented for the completion of the third examination.)

Third Examination. (1) Veterinary pathology (morbid anatomy, bacteriology and parasitology); (2) veterinary hygiene and animal husbandry, including nutrition and breeding.

Final Examination. (1) Principles and practice of veterinary medicine; (2) principles and practice of veterinary surgery.

A good deal of practical work has always been demanded of students, who have likewise been required to put in a stipulated amount of time "seeing practice" during vacations. Besides the written examinations, there has always been a considerable proportion of orals to be faced, so the student has never had an easy passage or been able to get by on paper work alone.

In July 1949, the Veterinary Surgeons Act, 1948, came into force. This has made the veterinary profession in Britain a closed one, and ultimately it will bring about an end of practice by unqualified persons. It has also had a profound effect upon veterinary training, for we are now in a transitional period midway between the old arrangements and the new. The new Act has paved the way for certain universities to establish veterinary schools, and to grant degrees in veterinary science. Subject to the approval of the Privy Council after consultation with the Royal College of Veterinary Surgeons, these degrees will entitle the holder to apply for immediate registration as a veterinary surgeon. In other words, the M.R.C.V.S. course is no longer the only road to qualification.

So far, the veterinary colleges in London, Edinburgh, and Glasgow have been incorporated, or are being incorporated, within their respective universities. In future their students will be taking a degree course instead of the M.R.C.V.S. course. At the present time, the Veterinary School of Liverpool University is

A cow at the field hospital of the School of Veterinary Science, University College, Liverpool, undergoing a test for tuberculosis.

carrying on with the M.R.C.V.S. syllabus and granting also non-registrable degrees in veterinary science. For the first time Cambridge has embarked upon veterinary teaching, and already a few students have entered upon a six-year course at the new school there. They will spend the first three years studying for the natural science tripos, and the last three on subjects leading to a degree in veterinary medicine. Bristol University has likewise established a new veterinary school.

The number of veterinary students qualifying each year in Britain is about 150, but it is expected that this figure will rise to 220, once graduates begin entering the profession from the universities of Cambridge and Bristol.

At present there are long waiting lists at most of the centers; and women, particularly, are finding it difficult or nearly impossible to secure a vacancy within a year or more of applying.

Women graduates mostly take up small-animal practice, leaving the care of farm animals to their male colleagues. They often do a certain amount of work among pigs, poultry and goats, however. In any case, they take the full course, which covers horses, cattle, sheep, pigs, poultry, dogs and cats.

Animal Health Trust's Work

Valuable work is being carried out by the Animal Health Trust, which is promoting and extending veterinary education and research. The Trust has already assisted veterinary training considerably, not only by its financial help to needy undergraduates, but also by the award of research training scholarships and fellowships. By this means, the Trust aims to create a body of veterinary specialists, who, by this further training, will be better fitted to embark upon an academic or research career. In its first seven years of existence, the Trust, which is an independent body supported entirely by voluntary contributions, has devoted more than £50,000 ($140,000.) to educational work. It has received support from many countries and has had the privilege, in return, of helping students and research workers from overseas to play their part in the world battle against animal disease; the importance of which has been emphasized in recent years by the world food situation.

The theme of the 14th International Veterinary Congress, held in London last year, was world food supplies and the veterinary profession.

A paper by this author read to a plenary session laid stress on the great scope for development in veterinary training as a contribution to international well being*. Progress in veterinary research and its application and in methods of training both practitioners and scientific workers is imperative if standards of animal health are to be lifted.

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Cobalt Deficiency

Much experimental work has revealed, at least partially, the role of cobalt in ruminant nutrition. This mineral, though required in only minute quantities, is essential for proper metabolism of certain microorganisms involved in the processes of rumen digestion and the synthesis of vitamins.

Cobalt deficiency is most common in the winter and early spring months. Normally, young, fast growing stock and heavy producers are affected first by deficiencies in the rations. Symptoms outlined by workers at the University of Wisconsin include, first of all, anorexia. Animals refuse concentrate feed for hay and roughage. As the deficiency progresses symptoms of depraved appetite are observed; animals lick or chew at anything within reach. Rapid loss of weight is recorded, with anemia and weakness, and in lactating cows, milk secretion eventually ceases.

The manifestations as outlined above are not pathognomonic. The interrelationships of cobalt with other trace mineral elements, and their influence on the bacterial flora and activity in the rumen are not completely understood. These matters are under intense study at research stations and agricultural colleges.

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Anthrax Treatment

After confirmation of clinical diagnosis of anthrax in a dairy herd, new cases that followed the death of one animal were treated. The earliest symptoms evident were elevated temperatures and decreased milk secretion. Edematous swellings in the region of the flank, forearm, and shoulder were also early symptoms. A total of five cases were treated successfully by the administration of 2,000,000 units of procaine penicillin in oil at two-day intervals. In each case, three doses were sufficient to effect complete recovery.—*H. E. Hansen, D.V.M., Vet. News, (Nov.-Dec.) 1950.*

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*Vet. Med., 44:446 (Nov.), 1949.

EDITORIAL COMMENTS

Nervous Symptoms in Cattle Due to Ergot on Dallis Grass

Dallis grass is adaptable to culture in the South and Southeast. It has found favor because it is drought and heat resistant and grows well on a wide variety of soils. Yields of nutritious forage have made it a desirable pasture grass widely used in grazing programs in Mississippi, Louisiana, Alabama, Georgia, and other states of the region.

Soon after the establishment of this grass in Mississippi, Dr. E. M. Ranck observed symptoms of poisoning in cattle pasturing on the plant. He produced nervous disease by experimental feeding. Dr. B. T. Simms, while director, Regional Animal Disease Research Laboratory, Auburn, Ala., described the symptoms and the toxic agent (*The Auburn Veterinarian*, 1:64 [Summer], 1945).

The toxic substance is reported to be an ergot that grows on the seed of the grass. The condition may then be referred to as a neurotropic ergotism. Symptoms develop when animals eat the mature plants (late summer and fall) carrying seeds which are infested with ergot. The infestation is practically universal where dallis grass is extensively cultivated, so that every pasture of this grass may be considered a potential and dangerous source of poisoning for cattle.

The causative agent, according to Simms, is an ergot which produces small sclerotia, approximately the size of the grass seed. It varies in color from yellow to dark brown or black. A staining characteristic is mentioned which may be noticed on clothing after walking through an infested pasture.

Symptoms are essentially nervous. Hyperexcitability and muscular incoordination are regularly observed. The observant owner may report that gentle animals stop grazing and move away when he approaches them. Any sudden movement unduly excites affected animals. After such excitement, incoordination and unsteady gait are observed. Extreme flexion of four limbs and further symptoms of muscular incoordination develop as the condition progresses. Animals will continue to graze unless severely poisoned; others fall, struggle to their feet and repeat the process. Practitioners in Oklahoma report almost complete cessation of milk flow in dairy cows and paresis in some individuals.

Affected animals should not be handled any more than absolutely necessary. If essential to move animals, it must be done slowly with a minimum of excitement. Provided bright hay and quiet, spontaneous recovery is the rule in from five days to two weeks; sometimes a longer period is required for complete recovery.

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Enrollment of Veterinary Students in ROTC

Veterinary Reserve Officers Training Corps enrollment for the academic year 1950-51 in the six veterinary schools participating in the program shows an increase of 20% over last year's enrollment.

Fifty-six percent of the 530 veterinary ROTC students enrolled this year are veterans.

Six veterinary schools, located at the following institutions, participate in the ROTC program: Colorado State College, Fort Collins; New York State Veterinary College, Cornell University, Ithaca; Iowa State College, Ames; Kansas State College, Manhattan; Ohio State University, Columbus; and University of Pennsylvania, Philadelphia.

Total ROTC enrollment in the 76 medical, dental, veterinary and pharmacy schools participating in the programs increased by 20% to 7,372 students. Pharmacy units made the largest gain of 53% with 503 students this year, with veterinary next, followed by dental schools with 19% and 1,451 students, and medical units with 18% and 4,888 students.

Veterans comprise 67% of the total ROTC enrollment in the four categories, a decrease of only 9% from the preceding year. Non-veterans exceed veterans only in the Pharmacy Corps units, where the ratio is 45% for veterans.

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One of the biggest problems confronting parasitologists and veterinarians is the absorption of insecticides, their storage in body tissue, possibly at toxic levels, and then slow elimination in milk. Chronic or acute poisoning has been reported after injudicious use of a number of these agents. Use of small amounts over sustained periods can also cause poisoning symptoms. These factors are interfering with the development and acceptance of several agents now in wide use.

Indications for Fluid Therapy

The indications for hypodermocylsis in small animals are numerous. Enumerating the most essential considerations, Dr. E. E. Sweebe lists the following:

1. To replenish lost fluid. This loss may be from surgery, accidental injury or disease.
2. To correct electrolyte balance. Dehydration, loss of fluid, is not only a fluid loss but a loss of those salts (electrolytes) dissolved in tissue fluids. Excessive vomiting or diarrhea affect balance of electrolytes.
3. To supply energy and nourish quickly.
4. In avitaminosis, especially deficiency of B complex factors. When large quantities of fluid are given over an extended period of time, some factors of the vitamin B complex are further depleted. Administration of thiamine or liver extract should be given at the time or after administration of parenteral solutions.
5. To assist in dehydration of certain tissue.
6. To overcome surgical or traumatic shock.

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To be Expected of Free Enterprise

Mr. C. B. Hoff, special representative of the Commercial Solvents Corporation, addressed the Kansas City Veterinary Medical Association, December 19, 1950. In his introductory remarks preceding an excellent discussion of antibiotics, the speaker referred to the record of sales price of penicillin. In the early stages of production in quantity, penicillin sold for $15. per 100,000 units. Now the price, less than eight years later, has been reduced to approximately 1/100 of this early quotation. Such an accomplishment, making a valuable therapeutic agent available in quantity at low cost, is an excellent example of what is possible under a system of free enterprise.

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The busy life of the practitioner demands that he rely heavily upon current professional and scientific journals to keep abreast of new findings and their practical application. New discoveries and applications which bear upon the art and science of veterinary medicine are coming with increasing frequency. Substantial expansion of purely veterinary research during recent years has contributed much to the knowledge of specific problems, yet stimuli and ideas recorded from many diverse fields often serve as the spark or groundwork for progress in animal medicine.—*C. A. Brandly, D.V.M.*

USDA Seeks to Import Mexican Meats

An amendment to the federal meat inspection regulations is being considered so that meat, meat food products, and meat by-products may be imported from Mexico. The proposed amendment would not apply to products such as fresh meats which are not permitted to be brought into the United States from countries in which foot-and-mouth disease exists.

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Laboratory Training Courses

A bulletin of Laboratory Refresher Training Courses to be given by the Communicable Disease Center, Federal Security Agency, U. S. Public Health Service, Atlanta, Ga., outlines the training schedule for 1951.

Practical refresher courses in the principles and practice of laboratory methods employed in the diagnosis of disease are offered qualified students. Emphasis is placed on the practical aspects of these procedures. Classes will be held at the Parasitology and Mycology Laboratories, Chamblee, Ga., the Clinical Pathology Laboratories, Atlanta, Ga., and the Virus and Rickettsia Laboratories, Montgomery, Ala. Duration of courses ranges from one to four weeks. This training is open to all grades of employed laboratory personnel from non-profit diagnostic laboratories who are approved by their state health officers. Special courses are designed for directors of these units.

For those interested, complete information and application forms should be requested from the Officer in Charge, Laboratory Training Services, Communicable Disease Center, U. S. Public Health Service, P.O. Box 185, Chamblee, Ga.

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The Washington State Veterinary Medical Association at a recent meeting formed a public health committee for the purpose of cooperating in planning and initiating veterinary aspects of programs directed at preventing transmission of animal diseases to man. The committee consists of Drs. J. C. Kraft, Seattle; R. H. Bradbury, Mount Vernon; D. E. Ferguson, Pasco; R. R. Weller, Tacoma; and Myles Van Hoosen, Pullman, who will work through Dr. M. A. Holmes, Veterinary Public Health Consultant of the State Department of Health. Such programs as develop will be in cooperation with the State Department of Agriculture, School of Veterinary Medicine of Washington State College, private veterinarians and other agencies.

New Foot-and-Mouth Infection Found in Mexico

The finding of a new center of foot-and-mouth disease in Mexico was announced January 2, 1951, by Secretary of Agriculture Charles F. Brannan, marking the first evidence of active infection of the disease in that country since December 1949. The infection was reported near the town of Colmalteco, Municipio of Espinal in the State of Veracruz, about 100 miles south of the northern quarantine line.

The owner first noticed three sick animals in a herd of 56 cattle on Wednesday, December 27. Two days later, additional animals were affected and he immediately reported the suspicious symptoms to authorities. At least 37 animals were found to show evidence of the disease. Laboratory tests confirmed the diagnosis. By Sunday, December 31, 1950, the infection had been identified as type A foot-and-mouth disease and all infected and exposed animals were eradicated.

The affected cattle had previously received foot-and-mouth disease vaccinations, but the last mass vaccinations were completed in the area during April 1950. No further vaccinations are planned at the present time.

Gen. Harry H. Johnson, Codirector of the Joint Commission, has notified Secretary Brannan that all possible precautions have been taken to prevent the spread of the disease from the infected premises, which were immediately quarantined. Disinfection crews were on the premises within a matter of hours. Inspection crews were also on the job re-examining every susceptible animal within a wide radius. Daily inspections will be maintained and test animals will be placed on the premises until the quarantine can be safely lifted. Periodic inspection will be maintained thereafter.

"Isolated outbreaks of the disease have been expected", said Dr. B. T. Simms, Chief of the Bureau of Animal Industry. "It would have been surprising if we had gotten by without another outbreak. That's why we have kept inspection teams operating within the quarantine zone."

Secretary Brannan praised the owner of the animals for his prompt reporting of foot-and-mouth disease symptoms, and Commission employees for their rapid response to the emergency.

"Only time will tell the extent of the outbreak", Secretary Brannan commented, "but we have every hope that the infection will be contained at the point of outbreak. This experience shows why we must be vigilant, not only in Mexico, but in this country as well."

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Obituary

Dr. L. D. Bushnell, professor emeritus of Bacteriology, Kansas State College, Manhattan, died at his home in Manhattan, December 24, 1950.

Doctor Bushnell was born in Michigan, October 18, 1880. He attended Michigan State College where he earned a B.S. degree. Later, he received his M.S. from Kansas University and Ph.D. from Harvard. He joined the staff at the Kansas school in 1908 and from the period 1912 to 1946 headed the Department of Bacteriology. He was elected to honorary membership in the A.V.M.A. at the San Francisco meeting in 1948; of which honor he was very proud.

During many of his active years, he devoted much of his time to the study of the diseases of poultry.

All graduates of the veterinary school had their training in bacteriology and poultry diseases under his direction. Dr. F. R. Beaudette, Rutgers University, New Brunswick, N. J.; Dr. Carl A. Brandly, Head, Department of Veterinary Science, University of Wisconsin, Madison; Dr. W. R. Hinshaw, Frederick, Md., and others of prominence in poultry diseases, are numbered among Doctor Bushnell's students.

He was always vitally interested in veterinary medicine and attended state and national meetings whenever possible. He was a featured speaker before numerous veterinary groups. He was the author of the chapter on fowl typhoid in Diseases of Poultry, edited by Biester and Schwarte.

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Latex Is Toxic for Bull Sperm

Recent investigations made at the Veterinary College of Stockholm, Sweden, proved that yet undetermined chemical ingredients in latex—widely used material for inner linings of artificial insemination outfits—are highly toxic to bull sperm, damaging up to 57% of it. On aging, these toxic ingredients disappear slowly from latex-rubber goods, or they can be extracted by immersing the articles in 96% alcohol, soap solutions or distilled water for four days. Vulcanized rubber has no damaging influence upon bull sperm.

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Excessive ligation delays healing of surgical wounds.

Dr. James Harlan Steele

Born in Chicago, Ill., on April 3, 1913. Father—Dr. James H. Steele, dentist. Mother—Lydia Nordquist Steele. Education—Hamilton Grammar and Lake View High Schools, Chicago, Michigan State College and Harvard University.

Due to heavy responsibilities at home, Doctor Steele was unable to attend college immediately upon graduation from high school in 1930. He, therefore, enrolled in the Northwestern University Night School in Chicago and was employed during the day. In 1937, following the death of his mother, Doctor Steele enrolled in Michigan State College and received his Doctor of Veterinary Medicine degree in 1941. Following graduation from Michigan State College, he obtained a Fellowship to the Harvard School of Public Health, where he was in attendance in 1941 and 1942.

Dr. James H. Steele

At the time of graduation in June 1941, Doctor Steele married Miss Ina Oberg, his childhood sweetheart. While he was at Harvard, Mrs. Steele developed pulmonary tuberculosis which hospitalized her from 1942 until 1948. The Steeles are thankful for the advances that have been made in public health which enabled her to come through her illness. Through the development of such surgical procedures as thoracoplasty, the advent of newer antibiotics such as streptomycin and her great determination to get well, Mrs. Steele was able to overcome the disease. In the past two years they have established a home and have a son, James H. Steele, II, born on October 7, 1950.

On page 73 of this issue, VETERINARY MEDICINE initiates a new feature; a department of Public Health.

Material presented in this department will be under the editorship of Dr. James H. Steele, Chief, Veterinary Public Health Services, U. S. Public Health Service, Communicable Disease Center, Atlanta, Ga., and will appear regularly. Training and experience qualify Doctor Steele to write authoritatively on this subject in which veterinarians in all branches of the profession are vitally interested and have an important role. On this page is presented a biographical sketch of the new department editor.

Professional Activities

Following graduation from the Harvard School of Public Health in 1942, Doctor Steele returned to the Michigan Department of Health where he had been employed in 1940-1941 on a part-time basis, while a student. After a short time, he joined the Ohio Department of Health, where he remained for 15 months. He then entered the U. S. Public Health Service as Assistant Sanitarian in November 1943. His first assignment in that position was in San Juan, Puerto Rico, where he was adviser and consultant on milk, meat, and food sanitation problems. In addition, he worked closley with the Army, Navy and Air Force in that area on veterinary public health problems and also gave assistance to the Pan-American Sanitary Bureau in the neighboring countries of Haiti and the Dominican Republic.

At the end of the war, Doctor Steele was recalled to Washington and instructed to formulate a veterinary public health program. In the next two years this program was developed and was integrated into the Communicable Disease Center in September 1947. It has continued to grow, and is now concerned with the problems of rabies, salmonellosis, creeping eruption, anthrax, encephalitis, brucellosis, Q fever, meat and poultry sanitation, and interstate quarantine problems that relate to animals or animal products and that are of public health significance.

Among Doctor Steele's accomplishments in the U. S. Public Health Service have been the organization of veterinary public health services and establishment of a professional cadre for veterinarians. Previously, veterinarians had

been classified as sanitarians or scientists. In the field, Doctor Steele's activities have been mainly concerned with assisting state and local health departments in establishing veterinary public health services and investigating how animal diseases are transmitted to man and what control measures can be instituted. Among the latter activities has been the control of rabies. One of the main objectives of the veterinary public health services is the eradication of rabies in the United States.

Doctor Steele is a member of the American Veterinary Medical Association, U. S. Livestock Sanitary Association, American Public Health Association, A.A.A.S., New York Academy of Science, American Board of Veterinary Public Health and many other veterinary, public health and scientific groups. Recently, he was named consultant to the World Health Organization on zoonoses and veterinary public health problems. During December 1950 he spent two weeks in Geneva, Switzerland, working on the international health aspects of animal diseases communicable to man.

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Chinchillas

Since the first successful experiment in chinchilla culture in the United States, these small animals valued for fine quality fur are now raised throughout the country. From virtual extinction in their natural habitat high in the Andes Mountains of South America, there are now some 90,000 breeding animals on world ranches.

According to Dr. Homer Greenlee, practitioner, Fort Worth, Tex., the chinchilla is hardy and vigorous. In nature it is completely herbivorous. Under conditions in breeding establishments as they exist here, it is subject to few diseases and limited numbers of parasites. Digestive disturbances range first among anomalies observed. The cecum, which is usually large in proportion to the animal's size, is most regularly attacked. Studies also reveal that food remains in the digestive tract for five days. A normal bacterial flora in the cecum assists in digestive processes. Diarrhea and impaction, symptoms usually resulting from errors in feeding constitute 95% of practice.

One of the anatomical peculiarities of the chinchilla is the urogenital tract of the female. The uterus opens only at breeding and parturition; the bladder and uterus having separate outlets. Two to three litters of two or three each are the rule; breeding frequently occurring on date of birth. Gestation period is 111 days.

Changes in Federal Beef Grade Standards

The Production and Marketing Administration of the USDA has announced that federal grade standards for steer, heifer, and cow carcasses will be revised in line with a proposal made last spring. This revision became effective on December 29, 1950.

The change includes combining the present prime and choice beef grades under the name "prime"; renaming the present good grade as "choice" and setting up a new grade to be called "good" which will consist of beef from the higher quality young cattle now graded "commercial." Beef from older cattle will continue to be graded "commercial."

This revision in the standards will make the grades more useful in reflecting beef production practices and consumer preferences. The higher quality young beef now in the present commercial grade is popular with a large segment of the population and its identification as a separate grade will be beneficial to both the producers and the consumers. By combining prime and choice grades, the grade name prime will become a more important factor in meat grading, as less than 0.5% of our total beef production qualifies for the present prime grade.

This shift in beef grade names should have no effect on price. Beef prices are determined by relative demand for different kinds of beef rather than by grade designations. Grades provide homemakers, retailers, packers and others a uniform guide for use in trading in meats.

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Ascorbic Acid Hastens Healing of Corneal Ulcers

Ascorbic acid is known to function in various oxidation-reduction reactions of tissue. It is also essential for normal metabolism. It appears to be necessary for fibroblastic formation of collagenous connective tissue and thus for wound healing.

The cornea is largely composed of collagen. In the light of the role of vitamin C in healing, Boyd and Campbell postulate its value in the treatment of corneal ulcers in man (*British Med. Jour.*, Nov. 18, 1950). A group of 51 patients suffering variously classified ulcers of the cornea were studied. One-half were given massive doses of ascorbic acid as supplementary treatment. The healing time in this group was significantly lessened, especially among those patients suffering deep lesions.

Action of Antibiotics

The mechanism by which antibiotics inhibit bacterial growth has not been completely explained. As a rule, inhibition is accomplished by interfering with metabolic processes which are fundamental to the bacterial cell, thereby preventing growth and division.

Studies which have been made on the various antibiotic agents have revealed that their action is varied. One antibiotic will inhibit growth in one way and another in another way. These may be enumerated as follows: (1) oxidation of a nutritive substance which is commonly reduced in the process of bacterial metabolism; (2) combination with the essential nutritive substances required by the bacterium rendering them unavailable for bacterial metabolism; (3) combination with enzymes produced by the microorganism preventing these enzymes from combining with and acting upon nutritive substances required by the microorganism for growth; (4) acting with the enzyme system of the bacterium producing substances, such as peroxides, which are injurious; (5) affecting the surface tension of the bacterial cell causing disruption of the cell; (6) influencing the respiratory mechanism of the cell. No doubt continued research will reveal other intricate physicochemical processes by which antibiotics inhibit growth.

Antibiotic effects may be germicidal and/or bacteriostatic. The ideal effect is one which causes the immediate death of bacterial cells but is not toxic to the cells of the host. Unfortunately, few of the antibiotics fall into this category. By inhibiting the multiplication of bacteria (bacteriostasis), antibiotics usually accomplish their purpose because this allows the normal defense (phagocytosis) of the animal to eliminate the invader. When the amount of antibiotic in animal tissues becomes depleted so that the inhibitory effect is lost the bacterium continues to grow and the infection persists. Hence, the necessity of adequate doses and a period of treatment long enough for the destruction of all invading bacteria.

In some instances bacteria develop a resistance to the antibiotic. This type of variation obviously gives rise to resistant strains which persist in the infected animal. The mechanism of antibiotic resistance has not been explained but it is presumed that bacterial enzymes become adapted to the effect of the antibiotic which enables them to function and the bacterium continues to grow. This adaptability of enzyme systems is nothing new and numerous examples of such types of physiological variations are found in literature. Strains of bacteria which survive antibiotic treatment are undoubtedly those whose enzyme systems are somewhat different from those which perish. In a sense, it is the expression of the age old factor "survival of the fittest." So the apparent development of antibiotic resistance by bacteria when grown in the presence of the antibiotic, may mean only that those which survive are those which were not so sensitive in the first place. While the development of a resistant strain of an organism by growing it in the presence of an antibiotic is understandable, it is more difficult to explain why a totally resistant strain of an organism, which is usually quite sensitive, is occasionally encountered. This may be an expression of the natural occurrence of antibiotic agents at some previous time under conditions not man-made.

Questions regarding the mechanism by which antibiotics inhibit bacterial growth are unanswered. There is reason to presume that antibiosis is one of the important regulating forces in nature and it is quite likely that the handful of antibiotics now available for use are only a small sample of tremendous numbers and kinds, with which both man and animals are in constant contact. The fact that there are variable resistances and susceptibilities of bacteria to antibiotics is likewise evidence that natural contacts have occurred in the long distant past.

The danger of developing resistant strains of bacteria is one of the unfortunate drawbacks to the use of antibiotic agents. The relationship of streptomycin to tuberculosis is an excellent example. There is little doubt that penicillin-resistant strains of staphylococci are being perpetuated by the indiscriminate use of this agent in treating bovine mastitis. The implications of this therapeutic procedure undoubtedly go further. The presence of antibiotics in milk products can develop resistant strains of bacteria among the human populations who use such products. Furthermore, constant contact with small amounts of antibiotics in foods may develop antibiotic-allergic reactions. Such reactions can easily nullify the benefits of excellent therapeutic agents.

The advocation of promiscuous and wide-scale use of any antibiotic by manufacturers may tend to reduce the demand for these agents; simply because of the loss of their efficacy in the treatment of infections once susceptible to the particular antibiotic.—*I. A. Merchant, D.V.M., Ph.D.*

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Warfarin is the name of a new rodenticide developed by Link of the University of Wisconsin under the auspices of the Wisconsin Alumni Research Foundation. Practically harmless for large animals, it results in death from internal hemorrhage in rats and mice consuming it. It is in the form of an odorless, tasteless powder usually mixed dry with cereal grains. No bait shyness seems to develop. Warfarin concentrates are mixed in the ratio of one part to 19 parts of bait. It is also on the market as a premixed bait. Sanitation and ratproofing buildings must not be neglected.

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Deficiencies in swine are usually due to lack of calcium, iron, copper and iodine. Calcium deficiency is present in most instances of "going down" in the rear quarters. Legume hay or pasture will supply calcium though grasses generally are low in phosphorus content. Goiter or big-neck is an iodine deficiency, and anemia of suckling pigs is due to lack of iron and copper. These conditions are not new to veterinarians.

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It has been asserted that dogs fed a nutritionally adequate diet, including flour bleached with nitrogen trichloride (NCl_3), will in time exhibit ataxia and irregular convulsions. The blame, in the past, has been placed on the bleaching agent. Now comes the *British Medical Journal*, March 18, 1950, in which it is stated that Melanby and his associates have isolated a crystalline gluten fraction from agenized wheat flour (flour bleached with NCl_3) which in an amount corresponding to 0.1 mg. of nitrogen daily produces severe epileptic seizures in five days in a ferret. The action of the isolated fraction is that of a cumulative toxin.

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When a cow is to be dried up as a preliminary to the next parturition, take away her grain ration and move her out of the usual milking barn. The noises and preparations incidental to milking will be stimulating; therefore the desirability of moving her to new surroundings.

The so-called Azur Blu mink was originally a native of the northern Quebec wild Labrador section. A very few of these survived in captivity and now as a result of inbreeding, linebreeding and culling, a pure strain that can reproduce itself true-to-type has been developed. This strain is a natural dark mink with a clear blue underfur.

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Milk from cows affected with mastitis is abnormal in composition and is therefore not suitable for making cheese. It coagulates slowly with rennet and forms a relatively soft curd. When recovery is complete, the milk again has normal properties.

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Woodward and Knapp are authors of The Hereditary Aspect of Eye Cancer in Hereford Cattle. They indicate that on the basis of the evidence available to them "there appears to be hereditary susceptibility to eye cancer." Also they state that "certainly it would not be advisable to select as a herd sire any calf with a history of eye cancer in preceding generations."

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A foreign veterinary journal discusses the significance of the femoral reflex as an aid in the early diagnosis of canine distemper. This reflex is said to be evident before symptoms of nervous involvement appear. The reflex is elicited by applying pressure simultaneously to both the medial and lateral aspects of the femur. In early distemper this causes pain to the animal as it frequently provokes attempts to resent the pressure. Usually nervous symptoms appear a day or two later, and then there is no longer response to femoral pressure.

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From a Holland veterinary journal the information is gathered that outbreaks of cowpox in cattle have occurred following the vaccination of milkers to immunize them against variola.

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In human leptospirosis (Weil's disease, spirochetal jaundice) aureomycin has given excellent results after penicillin failed to halt the progression of the toxic stage of the disease.

VETERINARY PARASITOLOGY

A. O. FOSTER, B.A., M.A., Sc.D.
Beltsville, Maryland

Improved BHC Sheep Dip

Benzene hexachloride dips are probably the most nearly perfect remedies known for the eradication of ectoparasites affecting sheep, including keds, lice, mites and ticks. Two minor problems have caused some difficulty, however, but both appear to have been solved by workers in South Africa*. In the first place, BHC dips lack the disinfectant action of the older arsenical solutions that were commonly employed against ticks and other parasites. At one time a condition known as "dipping lameness" was ascribed to the use of BHC. Later, "lumpy wool," "foot-rot" and miscellaneous wound infections were encountered. It will be recalled that these conditions were found to be caused by contaminating organisms and not by BHC. In order to endow these dips with the protective bactericidal and fungicidal properties of the arsenical dips, Monnig has recommended the addition of one pint of concentrated copper sulfate solution (prepared with three pounds of copper sulfate in 2½ gallons of water) to each 100 gallons of dipping fluid. Excellent results are said to have been obtained.

In the second place, BHC dips are unstable on account of the fact that the chemical, being insoluble, is in suspension. Settling occurs, but is not a serious problem because it can be avoided by deliberate agitation and/or the continuous passage of animals through the fluid. The continuous dipping of animals, however, removes proportionately more of the chemical than of the water. From practical trials, this problem was solved by employing an original strength of dip that was above the minimum required for efficacy, and by replenishing after a fixed number of dippings with a concentration exceeding even that of the original fluid. Presumably, the correction needed would depend in large degree on the fullness of fleece, density and length of fibers, and other factors, although no information is available on these points. For practical purposes, an acaricidal sheep dip (0.02%) is prepared with three pounds of commercial 40% wettable BHC per 100 gallons of water, and this is replenished after every 200 sheep by the addition of 100 gallons of water and five pounds of wettable 40% BHC.

A screwworm smear, containing lindane, has been developed by the USDA. The new treatment, designated EQ-335 and regarded as superior to formula MS-62, kills maggots that are deep in the affected tissue as well as those newly hatched and, apparently, also kills flies that are attracted to the wounds. Moreover, it does not stain the fleece nor interfere with the healing of wounds, and provides about seven days' protection against reinfestation or fly strike.

The material is applied with a paint brush. Infested animals should be treated immediately upon detection. In bad cases, medication should be reapplied in three to four days and thereafter at intervals of seven days, if necessary. After branding, dehorning, castration, docking, or other wounding operations, and whenever any new or open wound is detected in animals, the smear should be applied to protect against infestation.

For the treatment of infestation by the fleeceworm or other maggots, EQ-335 may be diluted with nine parts of water.

Full information about the new preparation is obtainable from the Bureau of Entomology and Plant Quarantine, Division of Insects Affecting Animals and Man, Kerrville, Tex.

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In comparative trials on sheep with two types of phenothiazine tablets, workers in New Zealand (N.Z. Dept. Agr., Annual Rept., 1948-49) found that 14% of one type was regurgitated some time after dosing. No regurgitation of tablets occurred after dosing with a second type. The results were presumably due to differences in the rate at which the tablets disintegrated in the rumen. The findings emphasize not only the importance of dosing with rapidly disintegrating tablets but also the fact that apparent differences in the efficacy of anthelmintic tablets for ruminants are not always nor entirely due to differences in the efficacy of the active ingredients.

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No other than chronic infected carriers are required for the transmission of leptospirosis. Infective organisms are shed in the urine.

*Monnig, H. O., BHC as a Sheep Dip. Primary Producer, p. 5, Dec. 9, 1949.

PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
Atlanta, Georgia

Veterinary Medicine Integrated with Public Health Program

In an era when professional isolationism is losing much of its glamour, it seems particularly appropriate to stress the essential unity of all public health activities and to recognize the value of veterinary medicine which is integrated with other preventive health programs.

During World War II, diseases like Q fever in southern Europe, Japanese B encephalitis in the Pacific Theater of war, Venezuelan encephalomyelitis in Trinidad, glanders and pseudo-glanders in China and southeastern Asia, arose as new problems in public health that required the unification of veterinary medicine with preventive medicine. Diseases now under cooperative study are rabies, brucellosis, creeping eruption, salmonellosis, leptospirosis, Q fever, and trichinosis.

In the Public Health Service, veterinary medicine, has participated in communicable disease control, with primary emphasis on the control of animal diseases transmissible to man; in research; in sanitation, especially as it pertains to food products of animal origin; in administration of interstate quarantine regulations that relate to animals; and in liaison with federal, state and other veterinary agencies, professional associations, and practitioners.

It should be emphasized that the above are in no wise the limitations of veterinary medicine in public health. The solutions to many problems presented, some new and others old, are within the field most familiar to those trained in the control of animal diseases. Man and his herds have been closely associated for centuries, each dependent on the other for development.

Though the purpose of all public health efforts is to safeguard mankind against disease, it is at once interested in the maintenance and improvement of vigorous health for all. In this, man is dependent on livestock for a variety of products essential and vital to his well-being. So close are relationships of veterinary medicine in public health problems that the veterinary practitioner has an important contribution to make in the total health effort. Also, it should be pointed out that veterinary public health utilizes the services not only of veterinarians but also of many scientists, including bacteriologists, physicists, medical officers, zoologists, and other professional groups. Scientific problems today have reached such a degree of complexity that it is no longer possible for an individual or single individual professional group to solve many such problems. Their ultimate solution requires the integration of a number of scientific specialists.

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Though many exaggerated and sensational statements have appeared in the press as to the deadliness of biological warfare (BW), Commander Frank R. Phiibrook, M.D., Director of the Preventive Medicine Division, Bureau of Medicine and Surgery, Navy Department, states that an enemy could not spread widely enough any BW agent to produce illness or death over great parts of the country.

Targets for BW are large civilian or military population areas. Air attack could be used with explosives. The agents would be neither effective nor detectable until incubated. Sabotage of water would have to take place at a point where chlorine residuals are low, not at reservoirs where water purification starts. Food sabotage would be directed at foods eaten uncooked.

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Col. Frank A. Todd, Veterinary Corps, U. S. Army, told delegates to the Conference of Public Health Veterinarians, that during a national emergency an increase in animal-borne diseases may be anticipated. Attributable factors include confusion that may exist in disease-control agencies during general mobilization, movement of troops, equipment and animals through disease areas during maneuvers, returning troops and equipment from foreign countries where various devastating animal diseases exist, and others. Veterinary military services are alert to prevent the entrance of new or foreign diseases into this country and to control and eradicate those diseases which now constitute a threat to our livestock economy.

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Diseases of both man and animals have a tendency to become chronic or more chronic over the centuries.—*W. A. Hagan, D.V.M.*

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

Cockroaches can be added to the long list of potential transmitters of salmonellosis, as the result of investigations reported by Olson and Rueger (*U.S. Pub. Hlth. Repts.*, 65:531, [Apr. 21], 1950). *Salmonella oranienburg* was used as the test organism, and under the conditions of the experiments, it was eliminated in the feces of the American roach for ten days; from the feces of the German roach for 12 days, and from the feces of the Oriental roach for 20 days. Postmortem examination of the Oriental roach showed that the test organism was present in its tissues for as long as 42 days after an infective feeding even though it had passed contaminated feces for only 20 days. Fecal pellets from an infected roach remained infective for as long as 199 days at room temperature.

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Those of you who are interested in game bird propagation will be interested in reading a report by Yeatter (*Science*, 112:529, [Nov. 3], 1950) on the effects of different preincubation temperatures on the hatchability of pheasant and quail eggs. These studies were conducted under a constantly controlled relative humidity of 65%, with varying degrees of temperature from 73 F. to 88 F. The eggs were exposed at these temperatures for nine hours for each of seven days and for 15 hours at 62 F. Controls were kept constantly at 62 F.

Incubation of the exposed eggs and control eggs indicated that the hatchability of pheasant eggs was reduced as the temperature rose, while Bob-White quail eggs were not significantly affected by the exposures used.

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The James E. Rice Memorial Library named for Prof. James E. Rice, Emeritus Professor of Poultry Husbandry at Cornell University, was formally presented to Cornell University recently at the annual meeting of Northeastern Poultry Producers Council. The library was made possible by an initial gift of $25,000. raised by friends of Professor Rice. It will act as a repository for books, journals, bulletins, films, photographs and reprints on all phases of poultry.

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Eggs freeze at 28 F.

The space and equipment needs for turkeys are reviewed by Asmundson in *California Turkey News*, September 1950. Some of the maximum requirements outlined by him are given below:

Range—1 acre per 800 poults.

Brooders—(without wire platforms) 1 sq. ft. per poult (to eight weeks of age).

Brooders—(with wire platforms) 0.5 to 0.7 sq. ft. per poult.

Electric Brooders—14 sq. in. per poult. (A 6-ft. round hover is adequate for 300 poults).

Gas Brooders—The floor and feeder space is the limiting factor. Most gas brooders provide heat for 400 poults.

Waterers for 1,000 Turkeys—Young poults, 10 to 15 one-gallon fountains; older birds, 10 to 15 deep cup or bucket type waterers, or 48 ft. to 72 ft. of water trough accessible on both sides.

Feeders for 1,000 Turkeys—Young poults, 42 ft., open on both sides, or a total of 84 ft.; intermediate size, a total of 160 ft.; on range, a total of 240 ft.

Admundson points out that the above figures do not cover all situations or all types of equipment, since local situations may influence both the amount and type of equipment needed.

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On September 19-20, 1950, there was held at the University Farm, St. Paul, Minn., the first annual meeting of the newly organized North Central States Pullorum Conference. This conference is patterned after the Northeastern Pullorum Conference, which has been holding annual meetings since 1928. The Northeastern Conference has pioneered in developing pullorum disease eradication programs, and in standardization of poultry disease diagnostic technics. The newly organized North Central Conference plans to follow the same methods in attempts to improve procedures used by its members through annual conferences and cooperative projects.

Dr. B. S. Pomeroy was chairman, and Dr. J. E. Williams, secretary of this year's conference. The officers for the 1951 conference will be Dr. C. D. Lee, chairman, and Dr. Paul E. Bennett, secretary. Both officers are from Iowa State College, Ames.

CLINICAL REPORTS

Leptospira Associated with Nephritis in a Mule

W. F. JACKSON, D.V.M., M.S., Athens, Georgia

A five-year-old mare was referred to the clinic, School of Veterinary Medicine, University of Georgia. The history elicited from the owner included anorexia for several days, oliguria, lassitude and a general weakness. A clinical examination revealed a temperature of 101.6 F. and a slight congestion of the conjunctiva. The pulse and respiration were in the normal range and there was a slight stiffness in the rear quarters.

In the laboratory the urine was found to be cloudy, thick and viscid, with a specific gravity of 1.078. The albumin and bilirubin content were difficult to determine due to thickness, but both were high. The reaction was neutral; indican, acetone and sugar were negative. A drop was examined under low power and was found to be filled with tubular casts, with a few bladder epithelia present. A dark-field examination was negative for motile organisms.

The blood examination revealed a normal red cell count, 12.15 gm. of hemoglobin, leukocyte count of 15,300 with a hemogram of 70% segmented neutrophils, 16% band cells and 14% lymphocytes. The neutrophils demonstrated a few vacuoles. The sedimentation rate was 40 mm. for 30 minutes and the packed cell volume was 39%. The icterus index was about 30 by visual color comparison.

A tentative diagnosis of nephritis was made and due to the slight similarity of the laboratory picture to canine leptospirosis a serum sample was submitted to the U. S. Public Health Laboratory for serological examination. The report, received after the mule was discharged, was positive for *Leptospira icterohemorrhagia*, 1:8 and *L. canicola*, 1:32. This is not of diagnostic importance and examination should be repeated in ten to 14 days.

The treatment consisted of 3,000 units per lb. of procaine penicillin with aluminum monostearate in oil (Upjohn) and 1¼ gr. per lb. of sulfamethazine orally. Two quarts of mineral oil were given by tube, which was followed by hemorrhage from the nostrils. The tube was well lubricated and there was no history of previous irritation. A mild diuretic was given for four days. The penicillin and sulfamethazine were repeated the second day. Normal micturition and defecation occurred the second day of treatment.

The urine sample on the fourth day was of normal consistency and contained only a few epithelial cells and phosphate crystals. The specific gravity was 1.035. The reaction was slightly alkaline, albumin 2+, and bilirubin 3+. The leukocyte count was 9,200, with 52% neutrophils and 48% lymphocytes. This reduction in neutrophils may have been relative and due to the sulfonamide therapy.

The appetite improved daily and on the sixth day the animal was discharged. A report was received that the animal died two days later. As the serum report had not been received from the laboratory, no attempt was made to get tissue sections. The client lived about 40 miles from the clinic.

Little, *et al.*,[1] discussed titers found in horses showing jaundice and conjunctivitis. In their opinion, positive serological results are not conclusive of Leptospira infection as the cause of abnormalities observed.

REFERENCE

1. Little, R. B., *et. al.*, An Outbreak of Bovine Leptospirosis in Pennsylvania. *Vet. Med.*, 45:104, 1950.

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The Value of Rumen Inoculation in Inappetence

W. ALLAN RIPLEY, D.V.M., Richmond Hill, Ontario, Canada

A four-year-old cow was admitted to the large animal infirmary at the Ontario Veterinary College on November 1, 1949. The following history was given by the owner:

The cow was in her second lactation period, and believed to be in calf at this time. She had been sick for approximately three weeks. Symptoms observed included anorexia, constipation, complete cessation of milk secretion and a general unthrifty appearance. The local veterinarian had been treating the cow with laxatives and ruminatorics, with little response shown to the treatment.

No diagnosis was attempted at the time of admittance. The cow was very listless, eyes were dull, she exhibited no desire to eat, and did not ruminate. She was weak and there was no evidence of any pain.

A urine test for ketosis was negative. Examination per rectum confirmed pregnancy, but no abnormalities of any description could be found.

Treatment

A tonic consisting of nux vomica, cobalt sulfate and syrup of hypophosphites with malt extract was prescribed; dosage: 1 oz. b.i.d. For the first few days, food yeast was also given. There was some slight improvement on this treatment.

Blood count at this time was normal and the differential count was within a normal range.

Tonic was continued. Laxatives were given with no appreciable effect. Eight days later the temperature rose to 105 F. Three million units of penicillin in oil were administered intramuscularly and the temperature was normal the next day.

Tartar emetic, 3 dr. daily, was given for two days, in an attempt to stimulate rumen movement. Protamone (iodinated casein) therapy was tried for several days. There was no response.

On November 11 the temperature rose to 105 F. Penicillin was given with no result. Disulfalac, 500 cc., was administered intravenously the following day. Temperature recorded was 107 F.

Another blood sample, taken on the 14th, showed a total of only 1,050 w.b.c. per cu. mm. The cow was given 25 cc. of ascorbic acid solution intravenously twice daily for three days, in an attempt to stimulate production of leukocytes. On November 16 the total leukocyte count was only 900 per cu. mm. The cow was emaciated and weak, and her temperature ranged between 103 F. and 104.8 F. during this period. She aborted on the 23rd of the month. It was felt that the high fever could very easily be responsible for this. The placenta had to be removed manually.

A blood count on November 28 totaled 3,650 leukocytes, an improvement over the last count. The case looked rather hopeless by this time. The cow had quit drinking water and therefore was given water by way of a stomach tube. In order to supply some nourishment, molasses was mixed with the water.

During all this time, the cow gave no evidence of pain or suffering that would indicate the cause of the abnormality.

A pail of rumen contents was obtained and mixed with warm water, then pumped into the rumen by way of a stomach tube. In three days, she was taking an interest in life, eating and drinking, and was much brighter in appearance. The constipation disappeared, bowel movements became normal in appearance, consistency and quantity. From this time on improvement occurred rapidly. The case was discharged on December 9, after five weeks of hospitalization. Lactation had commenced.

In this case, no cause could be found that would explain the symptoms. It would appear that possibly some agent may have been given that upset the balance of bacterial flora in the rumen, and that this resulted in stasis and atonicity. If this were so, rumen inoculation would seem to be logical and a practical procedure for treatment. Perhaps many of these obscure digestive disturbances need only inoculation of a sample of normal rumen contents to effect relief of symptoms.

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Recovery from an Unusual Injury

CLAYTON STEPHENS, D.V.M., Tupelo, Mississippi

Pictured is a six-year-old Jersey cow that was down with milk fever when the photograph was taken. Note that the character of fecal material on the ground just below the rectum is hard and formed into balls. This is a regular feature observed in these cases. The animal responded promptly to intraperitoneal

injection of 1,000 cc. of calcium gluconate. Complete recovery followed, without incident.

The remarkable recovery from an old injury to thoracic vertebrae posterior to the withers, noted in the picture, and subsequent history of the productive life of this animal has interested us for several years. The injury that resulted in the abrupt downward curve in the back was inflicted when the cow was under one year of age by mules pawing and biting her. Note break in line back of the withers. The depth of the depression at its greatest point is approximately six inches.

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Dextrose (5%) solution is recommended as the best general parenteral solution for the replacement of water loss.

ABSTRACTS OF LITERATURE

Nitrite Poisoning

While in man, nitrite poisoning is sometimes caused by sodium nitrite found in pickled meats which have been treated in brine, in animals it is often due to the formation in the digestive tract of nitrites from ingested nitrates[1]. The nitrate may occur as saltpeter (potassium nitrate—KNO_3) from stone walls or fences which, when dissolved by rain and allowed to accumulate in the stable and barn, may be consumed by animals. It is also found in water contaminated with manure. Finally, sugar beet leaves fed in too large quantities or access of animals to fertilizer (Chilean saltpeter—$NaNO_3$) may cause nitrite poisoning, especially in cattle. Treatment consists of administration of 1% methylene blue solution intravenously and an analeptic.—*R.S.*

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Reproductive Failures in Sows

Several groups of investigators have reported that approximately 20% of breeding sows fail to conceive when mated. Such losses justify the inquiries[2] made into the problem, which work is being pressed particularly in instances where the sire is considered to be in vigorous health.

A study of the swine herd at the Beltsville Experiment Station over a 12-year period revealed the fact that 21.9% of the sows failed to conceive during a breeding season and that 36.4% of all matings were infertile. In Wisconsin, it was found that 20.8% of the sows failed to conceive and 29.7% of all matings were infertile. Nalbandov reported (see VETERINARY MEDICINE, 45:477 [Dec.], 1950.) that about 3,000,000 sows and gilts used annually in the United States for breeding are sterile.

The authors obtained two groups of sows and gilts that had been bred at two to four different heat periods without conceiving. Records were furnished by owners who considered these animals to be difficult or shy breeders. Sixty-three of these females were obtained from farms in Wisconsin for study. One group was bred and a portion slaughtered four days later to determine the percentage of fertilized eggs; the second group were retained for 25 days after breeding.

Gross genital abnormalities were present in 63.7% of the gilts and 31.6% of the sows. Of these, abnormalities on one side only were present in 13.7% of the gilts and 15.8% of the sows. Thus, it appears that these genital deviations from normal were the principal cause of repeat breeding in gilts; whereas embryonic death was primarily responsible in sows. That brucellosis may be an important factor in lowered fertility has been shown by Hutchings, *et al.*, in their report of a study of eight naturally infected sows that farrowed a total of only 14 litters in a two-year period, though bred repeatedly to farrow twice yearly.

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Pooled Colostrum for Calves

That pooled colostrum kept at —15 C., thawed and pasteurized before feeding to calves, is an effective substitute for fresh colostrum, summarizes experiments reported by McEwen[4].

In this work, calves were collected from neighboring dairies where reliable statements could be had as to the opportunity a newborn may have had to obtain colostrum. These animals were separated in individual pens, and feeding studies made.

It was concluded that calves deprived of colostrum may survive and enjoy good health depending on the quality of milk fed. It is suggested that milk from cows in early stages of lactation may be able to replace colostrum, whereas that from cows in advanced lactation cannot.

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Supplements for Growing—Fattening Pigs

Growing—fattening pigs fed to a market weight of 200 lb. required 5.5% more concentrates per 100 lb. gain when pastured on brome grass than when on an alfalfa pasture[5].

Palatability of expeller soybean oil meal was responsible for consumption when fed free choice, of an amount double that required to balance the ration. This additional intake of protein supplement did not affect gains materially. Solvent soybean oil meal was shown to be even more palatable and was consumed in larger quantities when self-fed.

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[1]Lindner, A. F., Nitrite Poisonings of Man and Animals (translated). *Tierärztl. Umschau.* 5:285, 1950.

[2]Warwick, A. C., Grummer, R. H., and Casida, L. E., The Nature of Reproductive Failures in Repeat-Breeder Sows. *Jour. An. Sci.*, 8:569 (Nov.), 1949.

[4]McEwen, A. D., The Resistance of the Young Calf to Disease. *Vet. Rec.*, 62:83 (Feb. 18), 1950.

[5]Krider, J. L., and Terrill, S. W., Comparisons of Pastures and Supplements for Growing—Fattening Pigs.—*Jour. An. Sci.*, 9:289 (Aug.), 1950.

B-Vitamins and Cobalt Deficiency

The relationships between vitamin B_{12} and cobalt suggested investigation to determine if administration of vitamin B_{12} would alleviate symptoms of cobalt deficiency in ruminants[7]. Sheep were selected as the test animal. Vitamin B_{12} and other B-vitamins were given parenterally and orally. Criteria to determine beneficial or other effects included, in addition to relief of symptoms and return of appetite followed by normal weight gains, the determination of hemoglobin level at various periods of observation.

The isolation from liver of vitamin B_{12} that contained cobalt has been demonstrated to have striking properties in its effect on hemoglobin formation in the treatment of pernicious anemia in man. A cobalt deficiency in sheep is also characterized by a severe anemia. Other work has demonstrated that vitamin B_{12} concentrations are limited in sheep on cobalt-deficient rations. From these and other experiments it appears possible that cobalt deficiency might actually be a vitamin B_{12} deficiency due to failure of rumen synthesis of this vitamin.

Limited numbers of experimental animals are included in reports of experimental findings. Nevertheless, four sheep exhibiting symptoms of cobalt deficiency failed to respond clinically after a series of injections with rather small doses of crystalline vitamin B_{12}. Hemoglobin values were not increased significantly. Increasing the dosage substantiated the findings of the previous experiment indicating that vitamin B_{12} was of little or no value, either injected or given orally, in alleviating symptoms of deficiency exhibited by test animals.

The effect of vitamin B supplementation, except vitamin B_{12}, gave confusing results suggesting the need for further research. In this study two lambs recovered from all symptoms; others gave varying results.

The authors summarize their work by suggesting that ". . . the physiological role of cobalt in sheep is by some route other than through vitamin B_{12}, even though there is an extremely large synthesis of this vitamin in the rumen of cobalt-supplemented sheep. The beneficial action of this trace mineral may be through production of the members of the B-vitamins in the rumen."

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Every disease ever described still persists in natural hosts in some parts of the world.

[7]Hale, W. H., Pope, A. L., Phillips, P. H., and Bohstedt, G., The B-Vitamins in Relation to a Cobalt Deficiency in Sheep. *Jour. An. Sci.*, 9:484 (Nov.), 1950.

Transmission of Anaplasmosis

In an extensive review of the literature, Dikman[8] cites experimental evidence accumulated since 1912 that anaplasmosis may be transmitted to noninfected animals by arachnid and insect vectors. From these studies it is reasonable to accept the fact that ticks and flies are responsible for naturally occurring disease.

Of especial interest in these studies is that contrary to known factors of insect transmission of malaria, filariasis, onchocerciasis and trypanosomiasis, no development stage of anaplasmosis has been demonstrated in any stage of the vectors' metamorphosis. So far as is known, these potential disseminators of anaplasmosis are merely carriers of the infecting agent, acting in a manner not unlike transmission by mechanical carriers, such as unclean needles or surgical instruments.

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Honey Injections

The intravenous injection of 250 to 500 cc. of 20 to 40% honey solution is recommended in Germany[9] for the treatment of young horses and other animals. It has effects similar to glucose solutions in that it is an energy source. It is nontoxic and is claimed to increase the patient's resistance against infectious diseases. —*R.S.*

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Methyl Thiouracil for Swine Fattening

Controlled[9] experiments conducted at the Pathological Institute of the Veterinary College in Hannover, Germany,[9] proved that swine may be fattened more economically by the use of methyl thiouracil (abbreviated MTU). Tests lasted six weeks. Swine received feed consisting of potatoes, oats, barley, rye, corn, and only 1 to 1½ oz. of fish meal, daily. Recommended dose is not more than 0.3 gm. (4½ gr.) MTU daily per animal for the first eight days, with a reduction to 0.2 gm. (3 gr.) thereafter. The amount of starch feed needed per pound gained in body-weight was 13.5% lower than that of the control animals, representing a great saving in feeding costs.—*G. L.*

[8]Dikmans, G., *Am. Jour. Vet Res.*, 11:5 (Jan.), 1950.

[9]Voigt, P. H., *Deutsche Tierärztl. Wochschr.* 57:277, 1950.

[9]Schofer, E., The Use of 4-methyl-2-thiouracil for Fattening of Swine. *Deutsche Tierärztl. Wochenschr.*, 57:158 (May), 1950.

BOOK REVIEWS

Books reviewed in this department and any other books, if available, may be obtained by remitting the published price to the Book Department, Veterinary Medicine, Suite 803 Livestock Exchange Building, Kansas City 15, Missouri.

DOLLAR'S VETERINARY SURGERY—GENERAL, OPERATIVE, AND REGIONAL, edited by *J. J. O'Connor,* M.R.C.V.S., examiner to the Royal College of Veterinary Surgeons and to the National University of Ireland. Fourth edition. 1036 pages, 403 illustrations. Alexander Eger, Inc., Chicago, publisher, 1950. — Price $11.00.

This textbook has been a standard work on veterinary surgery for over 50 years. Occasional revisions, this the fourth in 40 years (with two reprintings of the third edition), have maintained its foremost place on the subject.

The organization of the contents has not been altered in this edition. The present method seems to serve best the purposes intended; to instruct the sincere student of veterinary surgery. Part I, General Surgery, is virtually the same as in the previous edition, dealing with elementary consideration having application to surgery. Part II, Operative Surgery, begins with consideration of the patient for surgery, control, anesthesia, etc., in chapter 1, and operation in chapter 2; the latter constituting 220 pages of the book. Part III, Regional Surgery, deals with affections amenable to surgery of different anatomical regions.

Many new illustrations have replaced old ones, though one recognizes those used in earlier editions. New material is also added and much of the text has been rewritten; other portions have been revised. The author has attempted to prepare the text to ensure that it will meet all modern requirements. In this effort he has fallen somewhat short. Though containing many illustrations, it needs surgical drawings and reproductions of photographs made of operations on the living animal to meet the needs of veterinary students and practitioners. These to show surgical approach, relationships of operative area to other structures, manipulation, repair, choice of suturing technic and postoperative care, and other pertinent and concise details that will assist the surgeon to attain higher levels of proficiency.

It is appreciated that one acquires surgical acumen and perfection by practicing the science; however, one also looks to a text of this nature for details that will assist in the standardization of operative procedures on the basis of accepted and proved practices.

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ELEMENTS OF HUMAN PHYSIOLOGY, by *Miriam Scott Lucas,* B.S., Ph.D., Assistant Professor, Department of Biological Science, Michigan State College. Second edition. 357 pages, 158 illustrations. Lea & Febiger, Philadelphia, Pa., publisher, 1950—Price $4.75.

This widely used textbook on physiology is written for preprofessional and professional students. It differs from many books on the subject in that elements of organs and systems are considered in relation to their functional importance. Structure is discussed only in so far as it contributes to a comprehension of the function.

Sequence and grouping of subject matter represent the approach which has grown from experience in teaching. Movement and support designate part I dealing with muscle function and that of associated tissue over the bone structure.

This is followed by the section on nerve physiology which governs integration of supporting tissues. Blood is considered in order and as introductory to the physiology concerned in respiration and circulation. Thus, the student is encouraged to build on his knowledge in a logical sequence and the understanding and application of this new knowledge is enhanced from the simplest to the most difficult portions that follow. Absorption, metabolism and nutrition; reproduction; and the physiological consideration of the endocrine system complete the work.

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OUR DOG: ITS COMPLETE RECORD. Frank Glenn Publishing Co., Kansas City, Mo., publisher.—Price $2.50.

This record book for the dog lover provides an outline in which to write a dog's story, a place for mounting pictures, etc. Some general facts are given about registering purebred dogs, and miscellaneous material that might interest those who wish to keep a record of a devoted pet.

VETERINARY ITEMS OF INTEREST

The Institute of Poultry Industry is 25 years' old and serves 750 plants in the United States.

The quality may be more important than the quantity of protein in the nutrition of hogs and poultry.

In the five-year period 1935 to 1939, the annual production of broilers in the United States averaged 70 million. In 1949, 787 million were produced. — *W. D. Termohlen, USDA.*

Knowledge gained by experimental study of the function of vitamins and the vitamin needs of animals, constitutes one of the most beneficial contributions to nutrition. Still to be explored are the interrelationship between vitamin elements, vitamins and proteins, and vitamins and mineral elements.

The incidence of untoward reaction in blood transfusion in the dog is rare.

Colombia is the only principal livestock-producing country in South America entirely free of foot-and-mouth disease.

In tests made at the University of Illinois, little or no off-flavor due to benzene hexachloride was detected in any of the roasts from hogs sprayed seven or more days before slaughter.

Differential diagnosis of acute mastitis is not possible on symptoms alone. The many and varied manifestations of udder inflammation noted and the nature of udder secretions are usually indicative only of the severity of the infection and the stage of disease processes.—*R. W. Brown, D.V.M.*

Members of the Faculty, School of Veterinary Medicine, University of Minnesota, St. Paul

Seated (L. to R.)—Drs. J. H. Sautter, M. H. Roepke, H. C. H. Kernkamp, W. L. Boyd, J. N. Campbell, R. Fenstermacher, B. S. Pomeroy, R. A. Merrill.

Standing (L. to R.)—Drs. P. J. Ostapchuk, G. W. Mather, J. F. Henry, J. C. Flint, P. B. Hammond, F. A. Spurrell, R. B. England, Allan Hemingway, D. E. Bartlett, Mr. T. M. Christison, Drs. A. N. Korsunsky, Hans Bendixen (visitor from Denmark), H. J. Griffiths, R. W. Brown, R. L. Kitchell, C. M. Stowe, T. B. O'Dell, H. H. Hoyt, J. E. Williams, D. G. Low, W. A. Malmquist, A. F. Sellers, Mr. W. R. Hess.

Staff members not included in the picture: Dr. C. C. Turbes, Mr. T. F. Setterquist, Drs. W. R. Pritchard, A. F. Weber, J. P. Arnold, C. E. Rehfeld, Gabriel Nahas, W. J. Hadlow, Jack Moulton.